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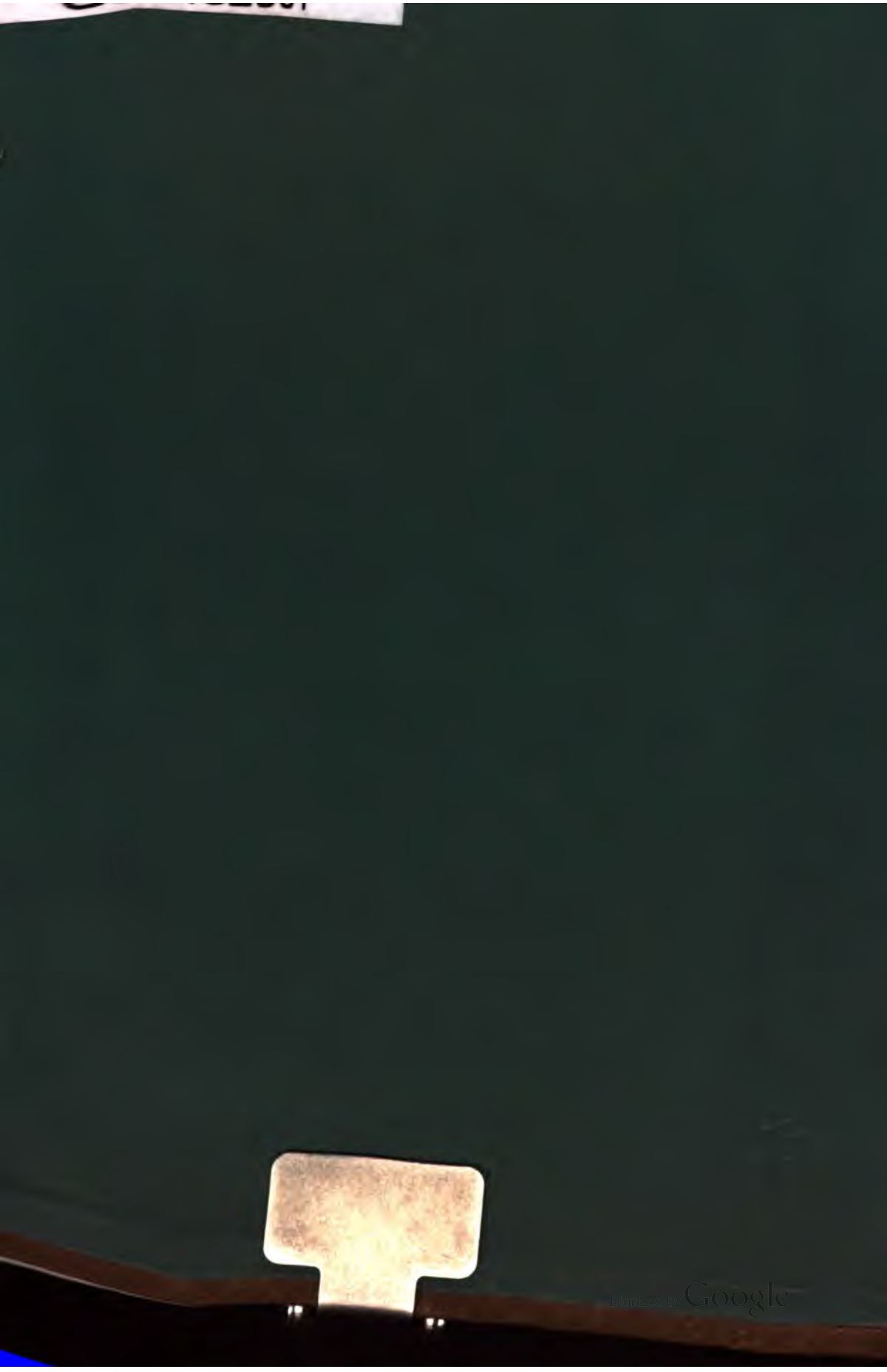
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BEING

A DICTIONARY OF SCIENCE AND ARTS, LITERATURE, BIOGRAPHY, HISTORY, AND GENERAL INFORMATION.

EDITED BY

CHARLES ANNANDALE, M.A.,

EDITOR OF OGILVIE'S IMPERIAL DICTIONARY OF THE ENGLISH LANGUAGE, NEW EDITION.

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JANIZARIES (Turkish *Jeni-tcheri*, new soldiers), an Ottoman infantry force, analogous to the Roman prætorians, which formed the guard of the sultan, and defended the frontiers. They were organized by the Sultan Orkhan about 1330, and in 1362 increased to about 10,000 by Amurath I., who gave them considerable importance by bestowing on them special privileges. They were kept up by continual additions from the sultan's share of the captives, and by recruits from the children of the Christian subjects, who were forced to give to the sultan one out of every five of their male children. These, as well as the Christian captives, were compelled to embrace Mohammedanism. When this soldiery had gradually acquired exorbitant privileges many young Turks solicited authority to enrol themselves in their body. They became a race of warriors so deeply imbued with the excellences of the military spirit that they proved in many instances a means of salvation to the empire. It was their boast that they had never fled in battle, and they were the nerve and the sinew of the Ottoman army. They generally formed the reserve, and were noted for the wild impetuosity of their attack. The whole body was divided into four squadrons, each containing a certain number of *ortas* (troops). Each orta, in Constantinople, was supposed to have 100 men; elsewhere, 200 or 300. In time of war the complement was 500 men. The regular troops of janizaries at one time amounted to 60,000, but they were afterwards reduced to 25,000. The irregular troops (*Jamaks*) amounted to 300,000 or 400,000. Their power became in time so dangerous and their insurrections so frequent that several unsuccessful attempts were made to reform or disband them. At various times sultans had been deposed, insulted, and murdered by the insurgent janizaries. At last, in June, 1826, they rebelled on account of a proposal to form a new militia, when the sultan, Mahmoud II., having displayed the flag of the Prophet, and being supported by their aga or commander-in-chief, defeated the rebels and burned their barracks, when 8000 of them perished in the flames. The proclamation of June 17th abolished the corps for ever, and laid a curse upon the name. As many as 15,000 were executed, and fully 20,000 were banished.

JAN-MAYEN, an isl. in the Arctic Ocean, 150 miles from the coast of East Greenland, frequented by sea-fowl, bears, and foxes. Beerenberg, a snowy mountain in this island, 6870 feet high, is in lat. 71° 4′ N.; lon. 7° 36′ W. There is also a volcano, 1500 feet high, an eruption of which occasionally takes place. The island was discovered in 1611 by the Dutch navigator Jan Mayen.

JANSENISTS. See JANSENIUS.

JANSENIUS, CORNELIUS (properly CORNELISZ JANSSEN), professor of theology at Louvain, and from 1636 Bishop of Ypres in the Netherlands, was born in 1585, and owes his fame to the controversy, during his age, concerning the nature and efficacy of divine grace. Owing principally to the different representations of this doctrine by Augustine, who found it necessary to express himself differently in his dispute with the Manicheans and in that with the Pelagians, this controversy was revived at the time of the Reformation. The vague and contradictory expositions of the Papal court on the subject served only to increase the contention in the Catholic Church, where the pride and jealousy of the Dominicans and Augustines on one side, and the artifices of the Franciscans and Jesuits on the other, kept up this angry controversy with increasing warmth, the former contending for the strict anti-Pelagian principles of Augustine, the latter adopting a milder interpretation of them. The latter obtained a triumph over their adversaries in 1567, by the Papal bull condemning seventy-six propositions taken from the writings of the chancellor and inquisitor at Louvain, Michael Baius (died 1589), a learned defender of the Augustine doctrine. But the Spanish Jesuit Louis Molina (died 1600) went too far on the other side in his more than semi-Pelagian commentary on the dogmatics of Thomas Aquinas. The violence of the Molinistic controversies compelled the pope in 1598 to establish the congregation *de auxiliis* at Rome, for the examination of opinions concerning grace; and this proving ineffectual to restore harmony, he wisely required (in 1611) of the contending parties silence on this doctrine.

Jansenius, who was an advocate of the strict Augustine system, which had always prevailed at the University of Louvain, died of the plague in 1638, at Ypres, with an unblemished reputation for piety and purity of morals. But his Augustinus, a book in which he maintained the Augustinian doctrine of free grace, and recommended it as the true orthodox belief, in opposition to the semi-Pelagianism of the Molinists, rekindled the controversy on its publication in 1640. The book was condemned by Urban VIII. in 1642, in the bull In Eminenti; but the partisans of Jansenius declared the bull to be spurious, the University of Louvain protested against it, and even in France it was ineffectual to suppress the applause with which many distinguished theologians received the Augustinus. The abbot of St. Cyran, a friend of Jansenius, known as the director of the nuns of Port Royal, and a zealous opposer of the Jesuits, as well as for his mysticism and ascetic piety, John du Verger de Hauranne (died 1643), had already prepared the minds of the French theologians for Jansenism. The scholars of the Port Royal,

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Nicole, Pascal (whose Provincial Letters had exposed the old sins of the Jesuits), and above all, Antoine Arnauld (born 1612; in 1641 made doctor of the Sorbonne), men distinguished no less for religious principles and unblemished virtue than for rare learning and talents, undertook the defence of Jansenius; and the bull in which the pope (1653) particularly condemned five propositions from the Augustinus, met with a strong opposition.

These propositions are perhaps contained in the book of Jansenius, but his partisans contended that they were not there *verbatim*, as the Jesuits asserted, at least not in the sense imputed to them by the bull. Hence arose the important question whether the pope, whose right to decide a point of doctrine had never been disputed, had authority to determine a historical fact. Alexander VII. assumed this in 1656, in a special bull, declaring that Jansenius had understood the propositions in the sense condemned. The Jansenists were thus compelled either to recant or to secede from the Roman Church. Although their protest against the arrogance of the Roman curia, in pretending to know and to determine what a deceased author meant by expressions which admit of a double interpretation could surprise no impartial person, it was regarded as an attack upon the infallibility of the pope, and drew down the displeasure of Louis XIV. himself. But it was found impossible to force the Jansenists to an unconditional subscription of the bull of Alexander VII.; and in 1668 the agreement with Clement IX., by which a conditional subscription was permitted them, obtained for them a temporary repose. In 1679 Arnauld, to escape persecution, retired into the Netherlands, where he continued till his death, in 1694, the most zealous and esteemed defender of Jansenism; but notwithstanding this loss, the party stood its ground under the protection of Innocent XI. (died 1689), who favoured them as much as Louis XIV. and the Jesuits opposed them. The Jansenists made themselves worthy of this protection, and of the favour of the better part of the educated men in France. By endeavouring to free theology from the chains of the hierarchy, and to promote a knowledge of the Scriptures among the people; by inculcating a sincere, earnest, and heartfelt participation in the exercises of devotion, and a strict purity of life, they rendered undeniable service to the cause of true religion.

Thus Jansenism, notwithstanding all the opposition to it on the part of the court, still maintained its position. Father Quesnel's Moral Reflections on the New Testament—the most universally read book of this period—gave it new support. The Sorbonne, in 1702, decided the celebrated case of conscience, whether a priest suspected of Jansenism could grant absolution, in the affirmative, and the Archbishop of Paris, Cardinal de Noailles, used his power against the Jansenists no farther than was necessary for the peace of the church. Clement XI. at first pursued the same course, but La Chaise, confessor of Louis XIV., and his successor the Jesuit Le Tellier, urged more violent measures, in which the king, in whose diseased fancy Jansenism and rebellion were synonymous, supported them. Quesnel, now at the head of the Jansenists, was struck from the list of the fathers of the oratory, and driven into exile. He died in 1719 at Amsterdam. In 1708 his New Testament was prohibited; the monastery of Port Royal des Champs, which was considered as the stronghold of Jansenism, was suppressed, and the work of persecution finally crowned by the bull Unigenitus in 1713, which was forced from the pope by Le Tellier. This bull condemned 101 propositions from Quesnel's Reflections, which, according to this decree, were to be understood only in a Jansenist sense, although they were, in fact, mostly scriptural sentences, forms from the liturgy, and articles of faith taken from the orthodox church fathers. The bull, therefore, only excited indignation and contempt, and increased the numbers of the Jansenists. Louis XIV. died in 1715, during the efforts that were made to carry it into effect in France; and taking advantage of the indifference of the regent, Noailles, with the majority of the French clergy, appealed from this decree of the pope to a general council.

Although the Jansenists were the original authors of this appeal, yet all the appellants were not Jansenists (see UNIGENITUS); but they all met with the same treatment, the ministers Dubois and Fleury, out of complaisance to the pope, insisting on the unconditional reception of the bull, and rigorously persecuting all recusants. Great numbers of Jansenists emigrated to the Netherlands, and the power of their party rapidly declined. The fanatical excesses of their party, from 1731, helped to ruin their cause. These were manifested more especially in connection with the tomb of one Francis of Paris, who was reputed a Jansenist saint. The frenzies of the Convulsionists, or those who were seized with spasms and ecstasies at the tomb of this wonder-working saint—of the Secourists, who availed themselves of external means to produce convulsions, and had themselves tormented with kicks, blows, and stabs—of the Naturalists and Figurists, who sometimes strove to represent the helplessness of human nature unaided by grace, and sometimes the purity of the Christian church by indecent exposures of the body—of the Discernants and Melangists, who divided on the question whether the raptures were produced by God or the devil—these, and other fanatical doings of Jansenists and Appellants, necessarily made a thing of which the world was already tired utterly ridiculous; and the energetic measures of the police, the continual burning of Jansenist books, the frequent imprisonments, but, most of all, the very natural subsiding of enthusiasm, at last put an end to the party. From this time Jansenism ceased to exist in France as a public and professed doctrine. Its pure morality and strict theology, however, always gained for it friends, even in that country; and a part of the clergy by their willingness to take the constitutional oath during the revolution, showed that they would more readily renounce the authority of the pope than their own opinion. But though the old division of the Jansenists and Molinists continued up to the latest times, in the opposition between those who took and those who refused the oath (*petites ins. modèles*), yet we find but one separate society of the Jansenists publicly acknowledged as such, and that in the Netherlands, which, in accordance with the resolution of the Jansenist provincial synod at Utrecht (1763), does not separate from the Catholic Church, and even respects the pope as its spiritual head, but denies his infallibility, rejects the bull Unigenitus, and appeals from it to a general council. It maintains, also, the doctrines of Augustine, upholds moral strictness, and regards the inward service of God as the greatest proof of piety. These Jansenists, who call themselves, by preference, the *disciples of St. Augustin*, have had since 1723 an archbishop of their own at Utrecht, and bishops at Haarlem and Deventer, forming a clergy which, being subject to the civil authority, without riches or power, performs its duties so much the more faithfully, and exercises a well-ordered church government, which they owe to the protection of Protestants, while they are still condemned by the pope as apostates and schismatics. Still, each bishop on his appointment notifies his election to the pope, and craves confirmation. The non-acceptance of the bull Unigenitus, however, has caused all their ad-

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vances to be rejected, and the chances of a reconciliation between the holy see and the Jansenists have been greatly diminished by the promulgation from the Vatican of the dogma of the immaculate conception of the blessed Virgin Mary, which called forth a fresh protest. The Utrecht Jansenists number about 5000, and are spread over twenty-five parishes in the dioceses of Utrecht and Haarlem.

JANSSEN, CORNELISZ, usually known as *Jansenius*. See JANSENIUS.

JANSSENS, ABRAHAM, a famous Dutch historical painter, supposed to have been born at Antwerp in 1569. He was very unfortunate in his marriage, and died in poverty, in what year is not known. He was the contemporary and rival of Rubens, though the place which he occupies beside him is very subordinate. He is chiefly admired for his colouring and accuracy of design. Many of his pictures are in the Flemish churches; of these the Burying of Christ and the Madonna and Child in the Church of the Carmelites at Antwerp are considered the best. Others of his pictures are in the galleries of Münich, Vienna, Berlin, and Dresden.

JANUARIUS, ST., Bishop of Benevento, was beheaded at Puzzuoli in the beginning of the fourth century, a martyr to the Christian faith, and is honoured as the patron saint of the people of Naples. His body lies buried in the crypt of the cathedral at Naples; but his head with two phials (*ampullæ*) of his blood which a pious matron caught, as the tradition is, at his execution, is preserved in a separate chapel. Of this blood the Neapolitans assert that as soon as it is brought near the head of the saint it begins to liquefy, however hard congealed it was before. A trial is made on three festivals each year, the chief of which is September 19, the anniversary of the martyrdom, and also when public danger or calamity exists or is impending. It is believed that the patron saint is particularly propitious if the blood moves briskly in the phials and appears of a clear red, while the opposite is regarded as presaging some ill to the country. Sometimes two or three days elapse before the blood becomes liquid; it is in a bottle which stands upon the altar, and is lifted now and then by a priest to show to the people whether it has become liquid or not; if it has liquefied all throng to the altar, and, kneeling down, kiss the offered bottle, and then the priest presses it against the head of the faithful. It is said that when the French occupied Naples for the first time the blood would not become liquid. The French general, apprehensive of a commotion, sent to the archbishop intimating that if the saint's blood did not soon run the archbishop's might. The saint had compassion on his servant, and the miracle took place in due season.

JANUARY, the first month of the year, was by the Romans held sacred to Janus, from whom the name was derived. The Roman year originally began with March, and consisted of only ten months. Numa added January and February to the calendar; but although the Romans as early as 251 B.C. accepted January as the first month of the year the nations of Europe did not universally adopt it as such till the eighteenth century. The 25th of March was the beginning of the ancient Jewish year, and that day, instead of January 1, long held a legal position in Christian countries as the opening of the year.

JANUS AND JANA, two ancient Latin divinities, whose names are only other forms of Dianus and Diana. Janus is probably identical with Sol, as Jana is undoubtedly with Luna or Diana. Numa named the first month of the year Januarius, after Janus, who presided over the beginning of all things. The first hour of the day was also sacred to him, and in all solemn sacrifices he was the first addressed, and had the title of father. The Romans pronounced his name even before that of Jupiter, and according to tradition he was in Italy before any of the other gods, but he was not on this account deemed superior to them. His principal festival was New Year's Day, when people gave each other presents, consisting of sweetmeats and copper coins having on one side the double head of Janus and on the other a ship. Janus was represented with a sceptre in the right hand and a key in the left seated on a glittering throne; he was also represented with two faces (an old and a youthful one), of which one looked forward and the other behind. Some conceive this to be a symbol of wisdom, which sees into the past and the future; others a symbol of the changes of the year, of the vicissitudes of the seasons, or of the four quarters of the world, as he was sometimes painted with four faces, and of his double office of opening and shutting the gate of heaven. In the Roman mythology it is related that Janus, one of the ancient kings of the Latins, taught his people agriculture, and introduced useful laws and religious institutions. Saturn, driven from his country by his children, fled to Latium, where he was well received by Janus, and made joint ruler of the kingdom. Under their reign was the golden age of Latium. All sorts of passages were under the care of Janus. After him a door was called *janua*, and every open arched passage by which people go out of one street or place into another a *janus*. For the same reason he was the god of the day and the year. Romulus erected to him the celebrated temple, which was opened at the beginning of every war, according to the ordinance of Numa, and remained open as long as the war lasted, and until peace was established in all the countries subject to Rome. The temple, however, was shut only three times in the long space of 700 years—once in the reign of Numa, again after the first Punic war, and the third time under the reign of Augustus A.U.C. 744. Vespasian also closed it in A.D. 71.

JAPAN (native name *Dai Nipon* or *Niphon*, that is 'Great Nipon,' the latter word meaning Sunrise or East), an island empire in the North Pacific Ocean, off the north-east coast of Asia, consisting of an archipelago, comprising three large mountainous and volcanic islands—Niphon, Kiusiu, Sikok—and an immense number of smaller, forming together Japan proper; of the large island of Yesso, north of Niphon, and separated from it by the Strait of Sangar or Matsmai, together with the larger and more southern Kurile Islands (Kunasiri and Iturup), forming a dependency called the province of Matsmai, and lastly of the dependency of the Loo-Choo Islands. It thus extends from lat 24° to 47° N., and lon. 128° to 151 E., being about 26° of lat. and 23° of lon. It is bounded north by the Sea of Okhotsk, east and south by the Pacific Ocean, west and north-west by the Strait of Corea, the Sea of Japan, and the Gulf of Tartary. The Japanese empire is made up of about 3850 distinct islands. The area of Japan Proper is estimated at 114,495 square miles, of which the main island occupies 89,016, Kiusiu 15,831, Sikok 6970, and the minor islands together 2678. Yesso has an area of 34,605, the two of the Kurile Islands that belong to Japan 3699, the Loo-Choo Islands 2670. The total area of the empire is therefore 155,469 square miles. In conformity with common usage we shall employ in this article the term Niphon to denote the largest island of the group, though it is only an older way of spelling the word Japan, and is applied by the natives to the empire. To the Japanese mind the mainland needs no distinctive name. The pop. in 1880 was 35,925,313.

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Physical Features.—The largest island, Niphon or Nipon, is upwards of 700 miles long north-east and south-west, breadth varying from 50 to 100 miles; Kiusiu, separated from Niphon by the Kino Channel, which in one part is narrowed to 2 miles width, is about 200 miles long north to south and 120 miles broad; Sikok, the third and smallest of the three principal islands, is 140 miles long by 60 miles broad. It lies east of Kiusiu, from which it is separated by the Strait of Boungo, which throughout its extent is limited by the west coast of Sikok, and at its narrowest part is not more than 10 miles broad. The straits to the north and east, which divide Sikok from Niphon, are scarcely broader, while they are so thickly set with small islands that the passage is frequently not more than 1 mile wide. Yesso is of a roughly triangular form, having its sides respectively 300 miles, 260 miles, and 220 miles in length. It is separated from Niphon on the south-east by the Strait of Tsugar, Matsmai, or Sangur, about 8 miles broad in the narrowest part. West of Niphon lies the important Island of Sado, between Cape Noto and Russian's Cape; it is supposed to be about 45 miles long and 21 to 24 miles broad. The narrowest part of the channel separating it from Niphon is about 30 miles wide. The coasts of the larger islands are extremely irregular, being deeply indented with gulfs, bays, and inlets, which form magnificent harbours. The surface also is generally uneven, and in many instances rises into mountains of great elevation. This is especially the case in the Island of Niphon, which is traversed throughout its whole length by a regular chain of mountains, the highest peak of which, Fusi-yama (Rich Scholar Peak)—a dormant volcano, covered with perpetual snow—is 13,977 feet high; but the elevation of the range is in general so low as to admit of cultivation up to the water-shed of its streams. The Japanese Islands form a part of the line of volcanic action which commences, in the north, with the Aleutian Isles, passes through the Philippines, Sumbawa, and Java to Sumatra, and then in a north-west direction to the Bay of Bengal. The volcanic vents, which indicate the direction of the line, are numerous in Yesso, Niphon, and Kiusiu; earthquakes, often causing great devastation, are of frequent occurrence, and it is calculated that every seven years a Japanese city is destroyed by their agency. In Yesso some dreadful eruptions have occurred—one in 1783 destroyed twenty-three villages; and the volcano of Wunzendake, one of five active in the Island of Kiusiu, is the terror of the surrounding inhabitants—an eruption of it in 1792 having destroyed 53,000 people. The prevailing formations in these islands are trachyte and basalt; plastic clay, marl, and felspar occur in various localities; and there are whole mountains of porcelain earth. The metallic wealth of the empire is known to be very great, comprising gold, silver, copper, tin, lead, and iron. The Island of Sado is particularly mentioned as rich in gold. Both the tin and copper of Japan are considered to be of very superior quality. Coal is found in various parts; sulphur abounds; thermal and mineral springs are of frequent occurrence; and ambergris is met with on some of the shores. Streams are numerous in Japan, but have very short courses, and are for the most part rather torrents than rivers. Though valueless as channels for the development of commerce they are of great value for the purposes of irrigation. There are a number of lakes scattered throughout the islands, the largest being Biwano-Oumi, in the southern part of Niphon, about 40 miles long.

Climate.—The climate of Japan, though extremely various—being intensely cold in the north, and about as warm as the south of France in the south—is, on the whole, much milder than its latitude would indicate; owing, chiefly, to the influence of the surrounding ocean. A remarkable difference of climate exists also between the east and west shores; the cold being more intense on the latter than the former, owing to the proximity of the Asiatic continent; while the east coasts are protected from the cold continental winds by the lofty central ridge of mountains that traverses the islands, north to south. From March to the second half of May a splendid spring prevails; from June to September summer extends, introduced by heavy rains followed by intense heat; from September to the end of November there is a brilliant autumn; and three months of winter succeed, rendered not unpleasant by the continued serenity of the sky. In Kiusiu, and in the south parts of Niphon, the thermometer ranges between 29° and 104° Fahrenheit, 80° being the average in the middle of summer, and 35° in the coldest months of winter. In lat. 32° N. ice is formed of several lines in thickness; in lat. 36° the lakes are covered with a sheet of ice, and in 38° to 40° the ice becomes so thick that the rivers may be crossed upon it; while in Yesso, near Cape Saga, lat. 45° 21′ N. winter is so severe as to drive the hardy Ainos to the protection of caverns. Rain is very frequent; hurricanes and water-spouts also occur often, and typhoons and equinoctial gales frequently sweep the seas about the change of the monsoons.

Vegetation.—The vegetation of the Japanese islands is exceedingly various, the products of the tropics being intermingled with those of the temperate and frigid zones. The palm, banana, bamboo, bignonia, and myrtle, flourish in the south, while in the north, more especially in the island of Yesso, oaks and pines abound. The forests of Yesso cover an area perhaps nearly equal to that of Ireland, and form a source of wealth that is as yet comparatively neglected. The finest of the Japanese indigenous trees are the evergreen oak and the maple. Sweet oranges, pomegranates, pears, apricots, peaches, and above 500 of the principal ornamental and useful plants, are of foreign origin, having probably been introduced from Corea and China. The camphor and varnish trees are indigenous. The *Kadsi*, or paper-tree, a species of mulberry, grows naturally in the fields, and furnishes textile fibres, from which paper is produced, a specimen of which was exhibited at the Great Exhibition of Paris in 1867. The soil of Japan is naturally indifferent; but the patient industry of the agriculturists, favoured by the genial climate, has covered with vegetation every spot capable of bearing anything. In the south the sugar-cane is cultivated with success; and rice yields two harvests, and constitutes the chief article of food. Wheat and barley are grown to a limited extent, and buckwheat, soy, potatoes, melons, pumpkins, and cucumbers, in great abundance. Ginger, pepper, cotton, and tobacco are cultivated in considerable quantities; and there are extensive plantations of the tea plant—yielding, however, a produce inferior to that of China. The flora much resembles that of North America.

Zoology.—Buffaloes and zebus are common; but they are used only for carrying burdens and for agricultural purposes. Horses of various breeds—and, though small, said to be very excellent—are numerous. There are neither asses, mules, elephants, nor camels, and sheep and pigs are few. In consequence of the general cultivation of the soil the wild animals are necessarily few in number; but bears, hyænas, deer, hares, foxes, and wild boars are still found in the north of Niphon. Dogs are common, and are held sacred; but though cats exist in thousands, the country is said to be overrun with rats

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and mice. There is a great variety of birds, including falcons, which are much esteemed; pheasants, of which there are two kinds, ducks, geese, teal, storks, pigeons, ravens, larks, pelicans, cranes, herons, &c. Snakes are not unfrequent; one species, the *ourabami*, attains an enormous size. There are also tortoises, lizards, scorpions, and centipedes; and of the insect tribes there are white-ants, winged grasshoppers, and several beautiful varieties of moths. The seas abound in fish, which are taken in great quantities, and along with rice form the chief subsistence of the inhabitants.

People, Religion, and Language.—The Japanese may be regarded as belonging to the great Mongol-Tartar family, though ethnologists have referred them to different types of mankind. They are distinguished, like all the other branches of this stock, by broad skulls and high cheek-bones; small black eyes, obliquely set; long black hair, and a yellow or light-olive complexion; some are good-looking, and many are well-made, active, and nimble. They are divided socially into two classes—military and non-military; the lowest of the former or two-sworded class ranking above the wealthiest civilian. The classes are kept distinct, with all the strictness of caste. Their principal moral characteristics are skill, perseverance, courage, and frankness; with much good humour, natural politeness, and courtesy of manner, except in the military, feudal, and official caste. The latter qualities are particularly observable amongst the agricultural population; who are, besides, industrious, temperate, and hospitable. The Japanese dress consists of loose garments of silk or cotton gathered in at the waist and fastened by a girdle, the men of the higher orders wearing a kind of petticoat-trousers, and those of the highest rank two swords. The custom of wearing two swords is now, however, falling out of fashion, and in Yeddo a Japanese with two swords is rarely seen. They wear no hats except in rainy weather; and shave the whole front and crown of the head, forming the rest into a tuft on the bald skull. The women, again, wear their hair very long, with numerous costly ornaments of tortoise-shell, but none of any other material. Their dress very much resembles that of the men. They destroy their natural complexions with paint, colour their lips purple, and, when married, blacken their teeth and pluck out their eyebrows. Polygamy is not practised, although the moral code of the Japanese is not otherwise, by any means, particularly rigid; various laxities being indulged in without scandal. All are slaves to custom and ridiculous, often oppressive, etiquette. In Yesso and in the Kurile Islands the population largely consists of Ainos. (See AINOS.) The established or state religion is that of Buddha, which is, however, exotic, and comparatively modern, although another and older form also exists, called Sinto or Sin-Syu (faith in gods, or way to gods). The priests of this sect are allowed to marry. The mikado, two ecclesiastical judges, the monks and the priests, constitute the hierarchy of Sin-Syuism. There are no fewer than eight sects of Buddhists. The language is not monosyllabic but agglutinate, and has an alphabet of forty-seven letters, which are written in two different forms, one rendered complex by the addition of variations, known as the *Hiragana* form of character; and the other, the *Katagana* character, entirely without variations, and consequently much simpler. The literature of Japan is copious, and includes works in all departments, historical, scientific, and imaginative, generally based on Chinese classics.

Manufactures and Trade.—In manufacturing industry and ingenuity the Japanese are, at least, equal to the Chinese. Their works in copper, iron, and steel bear a high character. Telescopes, thermometers, watches, and clocks, of good quality, are made at Nagasaki, one of the five imperial cities on the west coast of the Island of Kiusiu. Glass is made, but not very successfully. Silk and cotton cloths are manufactured; and porcelain, said to be superior to that of China. The production of silk has been greatly extended and improved of late years, but the produce is as yet inferior in quality to that of China. The art of japanning, as it is called with us, or more properly lacquering, is practised with great success; and specimens are produced far surpassing, in brilliancy and splendour, any that are ever seen in Europe. Lithochrome-printing has been long practised, and though the laws of perspective are not well understood, the outlines of animals and other figures are drawn with much truth and spirit. Good paper is made from the bark of the mulberry and other trees, and cordage from the fibres; but neither ship-building nor house-building are well understood. The houses are almost universally constructed of timber, plastered on the outside; and consist of two stories, divided into rooms by slight paper partitions. Foreign commerce was long rigidly limited to the Dutch and Chinese; but by treaties into which the Japanese government was reluctantly induced to enter in 1854 and subsequently, five ports have been opened to foreigners, and an extensive commerce established. These are Hakodadi, Hiogo and Osaka (forming one port), Kanagawa (Yokohama), Nagasaki, and Niigata. Tea and silk are the staple exports, and the imports from Europe most in demand are the various textile fabrics and window-glass. The total value of the imports of the direct trade between Japan and other countries in 1881 was £6,572,078; exports, £6,271,215. Since 1870 the Japanese have had a new coinage made in the country, the former coins having been made out of the country. The new coinage consists of 10, 5, and 2½ dollar pieces in gold, the dollar being the Mexican (= 4*s.* to 4*s.* 6*d.*), and of dollar pieces, 50, 20, and 5 cent pieces in silver, besides copper cent, half cent, and mil pieces. There is also a paper currency. The principal weights are the picul = 133 lbs. avoirdupois, and the kinn = 1⅓ lb. Measures of length: the shaku = 10 sun = 11⅔ inches, the ri = 36 chò = 2½ miles.

Government, Administration, &c.,—The government of Japan is a hereditary absolute monarchy, vested in the mikado. This was the ancient form, but in 1585 the emperor's commander-in-chief usurped the governing power, and for nearly three centuries reduced the mikado to a secondary position. The latter resided in the royal and sacred city of Miako (or Kioto), where he was kept secluded, under the guise of a mysterious sanctity; while the shogun, living at Yeddo, exercised imperial authority, and was regarded, by foreigners at least, as a second and supreme sovereign. In 1868, however, a revolution overthrew the power and office of the shogun—he had been usually, but erroneously, called by a Chinese title, *tycoon*—and the mikado was restored to his ancient supremacy. The mikado is absolute ruler in both temporal and spiritual affairs. He acts through an executive ministry, consisting of eleven departments. At the side of the ministry stands the sain or senate of thirty members, all nominated by the mikado, which has the right of giving instructions to all the departments of the ministry. In addition to these branches of the executive there are two deliberative bodies both assembled for the first time in 1875. The first of these is the genroïn composed of persons who have formerly held some office of state, and who must be proposed to the mikado for nomination by the saïn. This body discusses legislative proposals though it cannot itself originate any, and

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receives petitions. The other deliberative assembly is the chikuhokuaukuaigi or assembly of provincial prefects, which is summoned for the discussion of all matters relating to the internal affairs of the empire. In 1876 a new divison of the empire into provinces was made, and the number is now 38(35 ken or rural districts, and 3 fou or residential districts: Yeddo, Osaka, and Kioto). The revenue and expenditure for 1881–82 were each estimated at £13,714,800. Four-fifths of the revenue is derived from the land-tax. In July 1882 the total home debt including paper money in circulation amounted to £68,092,400, and the foreign debt to £1,907,600. The total strength of the army is calculated not to exceed 80,000, and the navy is as yet insignificant. Since 1872 the administration of justice has been made independent of the executive. Proceedings both in civil and criminal cases are oral and public. Japan has belonged since the 1st of July 1877 to the international postal union. See POST-OFFICE.

History.—Marco Polo is the first European traveller who speaks of Japan, called by him Cipango or Zipangou. In 1542 it was reached by Mendez Pinto, and shortly afterwards the Portuguese obtained permission to settle at Nagasaki, and established a highly lucrative trade. In 1549 the Jesuit missionary Francis Xavier arrived, and by his means and that of his followers many of the natives were converted to the church of Rome. But the government becoming jealous of the Portuguese, and irritated at the interference of the missionaries with the religious profession of the people, in 1585 expelled the traders, and compelled the native converts to return to their former faith. Several severe persecutions of the Christian converts ensued, and in one day 37,000 are said to have been massacred. But these persecutions partook much more of the political than of the religious character; and it was the undue interference of the Portuguese with the natives, and the not unfounded dread of their establishing a permanent dominion in the country, that incited the Japanese authorities to the perpetration of these enormities. Hence the Portuguese were finally expelled; and in 1640 the members of an embassy, sent from the government of Macao to the Emperor of Japan, were barbarously murdered by order of the latter, with the exception of twelve persons reserved to carry back the intelligence as a menace to their superiors. The Portuguese never afterwards recovered a footing in the country. Previously to this the Dutch had, in 1600, succeeded in establishing commercial relations with Japan, which by their prudent management they continued to maintain, notwithstanding the general proscription of all Christian powers, and till recently were the only European nation that possessed any intercourse with the country. The first attempt in modern times to reopen a commercial intercourse was made by the United States, who, March 31, 1854, succeeded, through the agency of Commodore Perry, in concluding a treaty by which the ports of Simoda in the island of Niphon, and Hakodate, in Yesso, were to be opened to American ships, but only for effecting repairs and obtaining supplies of provisions and fresh water. In October of the same year Admiral Sir James Stirling concluded on behalf of Great Britain a similar treaty by which the harbours of Nagasaki and Hakodate were to be opened to British ships for the same purpose. A much more important treaty, however, was effected by Lord Elgin with the Japanese government on the 26th August, 1858, by which the five ports already mentioned were opened to free commerce with Great Britain, under payment of certain fixed duties. The American government had a short time previously concluded a similar treaty with Japan, and other treaties of a like nature were soon concluded by various European countries. In 1869 Europeans were also allowed to establish trading houses at Yeddo, but no direct trade is done with foreign countries at this place, the port of which is Yokohama. The mission of Lord Elgin to Japan contributed much to inform us as to the condition of the Japanese, and since that time there has been a great increase in our knowledge both of country and people, an increase largely due to foreigners in the employment of the Japanese government. No Asiatic people have shown themselves more ready to adopt modern ideas than the Japanese have done since the mission of Lord Elgin. Japanese embassies have visited Washington, Paris, and London; and permanent embassies are now maintained at the capitals of the principal European powers as well as in the United States. Many Japanese youth are now sent to Europe for education. In 1872 a law was passed which provided for the establishment of about 54,000 primary schools or one for every 600 of the estimated population, and its provisions have been largely complied with. In the middle schools instruction is given wholly in English or some other foreign language. Many English and Americans are in the employment of the Japanese government, being engaged in surveying and engineering works, or as teachers and professors. A line of railway, 18 miles in length, was opened from Yeddo to Yokohama, in November, 1872, and another, 25 miles long, from Hiogo to Osaka, was opened in June, 1875, and has since been continued to Kioto. Since the beginning of 1873 there has been telegraphic communication not only between several of the ports, but also with Europe and Asia. In 1874 there was danger of a collision with China on account of the island of Formosa, where the Japanese were forming settlements, but the danger was averted by the conclusion of a treaty in which China recognized the right of the Japanese to make settlements in that island. Since then Japan put forward claims to the suzerainty of the peninsula of Corea, which might also have led to a war with China, but early in 1876 Japan preferred to relinquish those claims and conclude a treaty of commerce with the Corea. Christianity enjoys complete toleration, and Sunday has been adopted in the government offices as a holiday or day of rest. The revolution spoken of in the paragraph on *Government*, &c., was not accomplished without internal troubles, the seeds of which cannot yet be said to have been destroyed. Several risings of the nobles who, in consequence of the revolution were deprived of their privileges and to a large extent of their incomes, have taken place, and that of 1876–77 in the south of Niphon and in Kiusiu taxed the resources of the government pretty severely before it was quelled.

JAPANESE CYCLE AND ERA. See EPOCH.

JAPANNING is the art of varnishing in colours. All substances that are dry and rigid, or not too flexible, as woods, metals, leather, and paper prepared, admit of being japanned. Wood and metals require no other preparation than to have their surfaces perfectly even and clean; but leather should be securely stretched either on frames or on boards, as its bending would crack and force off the varnish. Paper should be treated in the same manner, and have a previous strong coat of size; but it is rarely japanned till converted into *papier mâché*, or wrought into such a form that its flexibility is lost. The article to be japanned is first brushed over with two or three coats of seed-lac varnish, to form the *priming*. It is then covered with varnish, previously mixed with a pigment of the tint desired. This is called the *ground colour;* and if the subject is to exhibit a design, the objects are painted upon it in

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colours mixed with varnish, and used in the same manner as for oil-painting. The whole is then covered with additional coats of transparent varnish, and all that remains to be done is to dry and polish it. Japanning requires to be executed in warm apartments, and the articles are warmed before the varnish is applied to them. One coat of varnish also must be dry before another is laid on. Ovens are employed to hasten the drying of the work. The same pigments which are employed in oil or water answer also in varnish. For painting figures shellac varnish is considered best and easiest to work; it is therefore employed in most cases where its colour permits. For the lightest colours mastic varnish is employed, unless the fineness of the work admits, or its durability requires, the use of copal dissolved in alcohol. Our japanned works are chiefly of iron and tin, such as coal-boxes, tin canisters, &c., which are both rendered ornamental and protected from rust. Much care is necessary to secure a high and equal polish. For a description of the Japanese process see LACQUERING.

JAPHETH, the name of the second son of Noah, and not the third, as is commonly but erroneously supposed. Of this we are informed in Gen. ix. 24. His descendants, according to Gen. x. 5, peopled the isles of the Gentiles. This is supposed to mean the coast-lands of the Mediterranean Sea in Europe and Asia Minor, whence they spread northwards over the whole of Europe, and thus Japheth is considered the ancestor of most European races, and is believed to have been the same who is called by the Greeks *Japetos*. Two derivations of Japheth have been proposed: 1st, from the root *pathah*, to extend, and hence the meaning is supposed to be 'widely dispersed,' in reference to the wide dispersion of his descendants over the northern and western regions of the earth; and 2d, from *yaphah*, 'to be fair,' an allusion to the fair complexion of the Japhetic races.

JAPURA, or CAQUETA, a large river, South America, an affluent of the Amazon. It has its sources in the Andes of Ecuador, about 50 miles north-east of Pasto; lat. 1° 20′ N.; lon. 76° 50′ W., and falls into the Amazon at lat. 3° S.; lon. 65° W.; having been for upwards of 350 miles of the latter part of its course wholly a Brazilian river. Its whole length is upwards of 1000 miles. It has numerous affluents from both the north and south, the principal of which are the Fragua, Caguan, Caninari, Apoporis, and Porcos. The navigation of the Japura is interrupted by a great cataract, which occurs in lat. 1° 10′ S.; lon. 72° 20′ W.

JAR, LEYDEN. See LEYDEN-JAR.

JARL, a word of Scandinavian origin, the same as *earl*, and applied in the early history of the northern European kingdoms to the lieutenants or governors appointed by the kings over each province. At a later period only one jarl was appointed in each kingdom, and the title of *duke* given him, as was the case in Sweden, for instance, in 1163. In Norway, after 1308, during the reign of Hacon VII., this dignity was conferred only on the Earls of Orkney and the princes of the blood. See ALDERMAN.

JAROSLAU, a town, Austria, Galicia, circle Przemsyl, left bank of the San, an affluent of the Vistula, 62 miles W.N.W. of Lemberg. It is situated in a beautiful district, contains a castle, a handsome cathedral church (Domkirche), and a normal school; and has manufactures of woollen and linen cloth, yarn, rosoglio, and refined wax; a considerable trade in these articles, and in honey, salt, and ship timber; and a yearly market, still of importance, though greatly fallen off. Pop. (1880), 12,422.

JAROSLAV, a government of Russia, bounded by the governments of Vologda, Kostroma, Vladimir, Tver, and Novgorod. It has an area of 13,000 square miles and a population of 1,051,948. The surface is generally flat, and in several places very marshy. It is watered by the Volga, the Mologa, the Sheksna, and their tributaries. With the exception of the ground occupied by woods and marshes, the whole government may be considered arable; but as the soil is by no means fertile, the grain produced falls short of the home consumption. The live-stock is comparatively small. The manufactures consist chiefly of woollen, linen, and cotton goods. The government is divided into ten circles, of which Jaroslav is the capital.

JAROSLAV, a town in Russia, capital of the government of same name, on the right bank of the Volga, 162 miles north-east of Moscow, with which it is connected by railway. Its site is somewhat elevated, and it is surrounded by a palisade, and defended by a fort. The houses are mostly of wood, and the streets are very irregular and narrow. Jaroslav is the see of an archbishop, the residence of a governor, and the seat of important courts. It contains sixty-six churches, several of them handsome; a theological seminary, and a college possessed of a library and a museum, and attended by about 500 students. The manufactures consist of linen, cotton and silk goods, leather, soap, ironware, &c.; and the trade is of considerable importance. Pop. 30,275.

JARROW, a town of England, in the county of Durham, on the Tyne, 6 miles below Gateshead. It has risen rapidly from a small village to a considerable town, its rapid growth being chiefly due to the establishment of iron ship-building, marine engine works, blast-furnaces, rolling-mills, and staithes for loading ships with coal. Other works are metal extracting establishments, chemical works, paper-mills, cement works, and a large lead manufactory; new docks have also been constructed. The town contains a mechanics' institute, a market-square with a capacious hall, public baths, and an infirmary. There are three churches, St. Paul's, Christ's, and St. Peter's, the former, recently restored and extended, being the church of the Venerable Bede, who was born in the parish and buried in the church, and whose chair, and the stone on which he sat, are still preserved; besides eleven other places of worship. Access is had by the river and by a branch of the North-Eastern Railway. The population, which in 1861 was only 4666, was 25,469 in 1881.

JASHER, BOOK OF (Hebrew, *Sepher hayashar*, 'the Book of the Upright,' as given in the margin of the authorized version; but *Sepher hashir* in the Peshito Syriac, 'Book of Praises or Hymns'), a lost Hebrew work, twice mentioned in the Bible (Josh. x. 13 and 2 Sam. i. 18), and about which various conjectures have been made. The Jewish rabbis identified it variously with Genesis, 'the Book of the Upright,' from its containing the histories of Abraham, Isaac, and Jacob; with Deuteronomy; with Judges; and with the book of the twelve minor poets—a diversity of opinion impossible on the supposition of any existing book that could lay claim to the title. Some authorities suppose that it was a series of annals; others that it was a collection of hymns from which the Psalter was compiled; and others that it was a Hebrew minstrelsy celebrating the exploits of the national heroes. Whatever its contents may have been, it seems from the specimens preserved to have been metrical in form. From the mention of the book in Joshua and 2 Samuel it has been inferred that the book of Joshua could not have been written before the time of David's lamentation. But this assumes that the book of Jasher was all written at once, an assumption which in our ignorance regarding it we are not at liberty to make; for the book of Jasher may, according to one of the

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hypotheses mentioned above, have contained a series of historic events, and have been written at different times. The theory of Dr. Donaldson as to its scope and contents, in conformity with which he proceeded to reconstruct it from the fragments which he thought he could trace throughout the several books of the Old Testament, has met with little favour either from English or continental scholars. See his preface to Jashar, or Fragmenta Archetypa Carminum Hebraicorum in Masorethico Veteris Testamenti textu passim tessellata.

JASIKOV, Nikolai Michailovitch, a Russian lyric poet, born at Simbirsk in 1805, entered the Mining Institute of St. Petersburg in his eleventh year, and then joined a corps of engineers. Still strongly attached to literary pursuits, he carefully read the works of the poets Lomonossov and Dershawin, whose influence on the formation of his taste is very apparent. After a year he left the engineers, and lived retired for about eighteen months, during which he gave proofs of his poetical talent. He first made his appearance as an author in the journal Sorevnovatelj. From 1823 he lived several years in Dorpat, where he made the acquaintance of Shukovski and Pushkin. In 1829 he removed to Moscow, and obtained an appointment under government. In 1833 he published a volume of poems. Shortly after his health began to give way. He returned to Simbirsk to try the effect of his native air, but receiving no benefit went abroad, and spent five years at Hanau, Nice, and the Lake of Como. His disease still continued to make progress, and he died in 1846. In the early part of his career he was regarded as the songster of love and wine, and received the name of the Russian Anacreon, but after his illness he began to write in a more sober and earnest style. He is remarkable for the power which he possesses over his native tongue. A complete edition of his poems in two volumes was published at Moscow in 1858.

JASMIN, Jacques, or Jaquou Jansmin, the most eminent patois poet of France, and the last who inherited the language as well as the spirit of the troubadours, was born 6th March, 1798, at Agen, department of Lot-et-Garonne. In his Mous Soubenis (My Recollections) he gives a humorous description of the humility of his origin and of the poverty of his kindred. His grandfather in his later days was an inmate of the poor-house, his father was a tailor, and he himself was set to learn the trade of a hairdresser, to which calling he remained true in spite of his success and fame as a poet. All his poems and songs are written in the patois of the peasantry on the banks of the Garonne, which is supposed in its purest state to be identical with the old Provençal, the language of the troubadours. His poetry deserved and acquired more than a local celebrity, and was warmly welcomed not only in Southern France, but throughout the whole of Europe. He was elected a member of the academies of Agen and Bordeaux; the city of Toulouse awarded him a gold laurel; and in 1846 he was created a Knight of the Legion of Honour. On his death at Agen, 5th October, 1864, his remains received a pompous funeral. The poetry of Jasmin is distinguished by beauty and power, and though his genius inclined him to gaiety rather than to pathos, yet perhaps his most striking and successful passages are those in which he addresses himself to the feelings. His principal works are Lou Chalibari (The Charivari), 1825, a mock-heroic poem; L'Abuglo de Castel-Cuillé (The Blind Girl of Castel Cuillé), 1836, his master-piece in poetry, which has been translated by Longfellow; Las Papillotos de Jasmin (The Curl-papers of Jasmin), of which the first part appeared in 1835, and the second in 1843; and Lous dous Frays-bessous (The Two Twin-Brothers), 1847. Miss Costello's Béarn and the Pyrenees contains an interesting account of Jasmin, and his own autobiographical sketches have been reprinted several times since his death.

JASMINE, a beautiful genus of plants of the natural order Jasminaceæ; fruit a two-seeded berry. Many species are known, all of which are shrubs, often with long twining branches bearing usually compound leaves and fragrant flowers; natives principally of India. The oil of jasmine is obtained from *Jasminum officinale* and *J. grandiflorum*. Two species are natives of the south of Europe.

JASON, son of Æson, king of Iolcos in Thessaly, and of Polymēdē, a hero of ancient Greece, celebrated for his share in the Argonautic expedition, before which he had distinguished himself in the Calydonian hunt. He belonged to the family of the Æolidæ at Iolcos, and his instructor was the centaur Cheiron, who educated most of the heroes of that time. (For his adventures in the Argonautic expedition see article Argonauts.) On his return to Iolcos with Medeia as his wife he avenged the murder of his parents and his brother by putting Pelias to death. But he was unable to retain possession of the throne, and was obliged to resign it to Acastus, son of Pelias, and flee with his wife to Corinth. Here they passed ten happy years, till Jason, wearied of Medeia, fell in love with Glaucē (Creusa, according to some accounts), daughter of Creon, king of Corinth, married her, and put away Medeia and her children. Medeia having revenged herself on her hated rival, fled from the wrath of Jason in her car drawn by winged dragons, the gift of Helios, to Ægeus, king of Athens, after she had put to death Mermerus and Pheres, her sons by Jason. According to some, Jason killed himself from grief; but others relate that, after passing a miserable wandering life, he came to his death by the following accident:—As he was sleeping one day, overcome by weariness, on the sea-shore, in the shade of the vessel which had borne him to Colchis, a beam fell upon him and crushed him. Others say that he was afterwards reconciled to Medeia, and returned with her to Colchis, where, after the death of his father-in-law, he ruled many years in peace. In several parts of the ancient world Jason was worshipped as a hero.

JASPER. This name is usually restricted to a variety of the mineral quartz, with a deep brown, yellow, or red colour, and resinous lustre. The brown-coloured jasper is termed Egyptian from its abundance in that country. When stripes of green, yellow, and red occur in the same mineral it is termed striped jasper. Jasper agate is reddish-white. Red jasper is not infrequent in Scotland. This variety appears to derive its colour from the presence of iron.

JASSY, or Yassy, the capital of Moldavia, one of the provinces of Roumania, on the Baglui, 162 miles W.N.W. Odessa. It is built on two hills, one rising gradually, the other so precipitously as to be detached from the rest of the town. A very large space is covered by the town, the houses being generally provided with gardens. The streets are mostly narrow and winding, and several quarters of the town have a very mean appearance. But a great fire in 1822 having destroyed nearly 5000 houses, new buildings have sprung up, generally of a handsome appearance. Some streets are long and spacious. This is particularly true of the principal street, which is the great place of concourse and business, and is lined on each side by a long row of shops, generally kept by Jews. The ecclesiastical buildings are very

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numerous. Among them may be mentioned the metropolitan church of St. Nicolas, the churches of Sokolla, Tschetezuje, and Galata; the archiepiscopal palace, the convent of Trisweletch, several Jewish synagogues, the Roman Catholic and the Lutheran church, &c. Jassy has, besides, a large bazaar, public baths, a university, a museum with a public library, a theatre, and five hospitals, one of them having a revenue of nearly £50,000. There are scarcely any manufactures, but the trade is of some importance, and a great deal of business is done at the fairs. Successive conflagrations, the last in 1843, have destroyed nearly all the wooden houses. The place suffered also in the Russo-Turkish war of 1854–56. But it has revived greatly since the establishment of the Roumanian principality, and its population is estimated at 90,000—55,000 being Jews.

JASZ-BERÉNY, a market town of Hungary, capital of the district of Jazygia, 38 miles E.N.E. of Pesth. It is prettily situated on both sides of the Zagyva, which forms two islands near the centre of the town. These have been planted and laid out as walks. In the public square, nearly opposite, are the remains of an old fortress, within which Attila, king of the Huns, is said to have been buried A.D. 458. The buildings most deserving of notice are a large and handsome Roman Catholic church, a Franciscan monastery, with church attached; a Protestant church, town-house, with register-office; guard-house, and royal gymnasium. The district around is of considerable fertility, producing much corn and wine, and rearing many cattle, sheep, and horses. There are three important annual fairs. Pop. 21,507.

JATIVA (or XATIVA), SAN FILIPE DE, a city of Spain, province of and 36 miles S.S.W. Valencia, on the slope of a hill crowned by an ancient and strong castle, with thirty turrets and a double fosse; near the confluence of the Guardamar and Albayda. The houses are in general well built, the streets generally wide, clean, and paved. The principal and collegiate church, in the form of a Latin cross, is a fine structure, containing many curious and interesting monuments, and having a handsome dome. In the environs are a bull-ring, and two public walks decorated with trees and fountains. Manufactures:—linen and woollen fabrics, hats, soap, earthenware, candles, and silver vessels. Pop. 13,168.

JAUER, a town of Prussia, province of Silesia, government of and 10 miles S.S.E. Liegnitz, on the right bank of the Neisse. It is surrounded by a double wall, with four gates; has two suburbs, several courts and offices for the circle, two churches, several schools, a savings-bank, house of correction; manufactures of linen, gloves, hosiery, ribbons, starch, and tobacco; a worsted and several other mills, tile-works, and a trade in cattle. The prosperity of Jauer was much reduced by the Thirty Years' war. Pop. 10,603.

JAUNDICE is a disease of which the distinguishing peculiarity is, that the whole skin becomes yellow. It proceeds from some disease about the liver, or its communication with the bowels. The internal symptoms are those of all disorders of the digestive organs, except that the water is dark and loaded with bile, while the bowels appear to be deprived of it. The yellow colour is first perceptible in the whiter parts of the body, as the white of the eye, &c., and soon overspreads the whole body. There is often an extreme itching and prickling over the whole skin. After the disease has continued long the colour of the skin becomes gradually deeper and darker, till the disease becomes at last what is vulgarly called the *black jaundice*. This appearance arises from the bile being retained, from various causes, in the liver and gall-bladder, and thus being absorbed and circulated with the blood. It may be produced by obstacles to the passage of the bile of various kinds, and is often suddenly induced by a violent fit of passion, or more slowly by long continuance of melancholy and painful emotions. It is a very common figure of speech to say that 'a person views a thing or a person with jaundiced eyes;' but this is founded in a mistake; for it is not true that jaundice communicates such a colour to the transparent part of the eye as to affect the colour of objects. The above phrase is therefore inappropriate.

JAVA (native, *Siti-Java*, land of Java), an island in the Indian Archipelago, the principal seat of the Dutch power in the East, having as its capital Batavia. Next to Sumatra, Borneo, and Celebes it is the largest in the Sunda group, and has on the north the Java Sea, south the Indian Ocean, is separated west by the Strait of Sunda from Sumatra, and east by that of Bali from Bali; lat. 5° 52′ to 8° 51′ S.; and lon. 105° 15′ to 114° 35′ E. In shape it somewhat resembles a parallelogram, the greater axis of which lies east and west, with a slight inclination north at the west end. It is 630 miles long, by 35 to 126 miles broad; area, 49,730 square miles. Java and the smaller adjacent island of Madura, situated on the north near the east end, are divided into twenty-two provinces, called residences, of which the population in 1880 amounted to 19,834,702.

Physical Features.—The Indian Ocean, which beats with great force along the south coast, has prevented the formation, on that side, of such alluvial plains as extend along the north parts. From the same cause the south coast is generally unsafe for shipping, while the north affords excellent anchorage at almost all times and places. The south presents a continuous front of crags and rocks, forming the outer edge of an extremely mountainous country; the north is flat and low, and covered in many places with mangrove swamps. The chief harbours on the north are those of Batavia and Sourabaya; on the south that of Cali Pujang, formed by the small island Nusa Kambangan. The island is traversed in its whole length by two chains of mountains, which sometimes unite, and at other times depart from each other, forming ramifications sloping gently down to the shore. The two chains, from 10,000 to above 12,000 feet high, are thickly set with volcanoes, active and extinct, from 6000 to 9000 feet in height; some of them, rising to 12,000 feet, are seen at sea from a great distance, and form landmarks to the navigator. These mountains are intersected by large and beautiful valleys, watered by rivers and torrents, and covered with thick forests. Java has no metallic veins fit for being wrought; the Bantam coal-mines yield only lignite; naphtha and asphalt abound in various localities; and the salines of Koewoe, south-east of Samarang, yield a tolerably large supply of salt. Warm medicinal waters are very plentiful. There are at present thirteen active volcanoes, which are remarkable for the quantity of sulphur and sulphureous vapours they discharge. The crater of an extinct volcano near Batar, called Guevo Upas, or the Vale of Poison, about ½ mile round, is held in horror by the natives. Every living creature that enters it drops down dead, and the soil is covered with the carcasses of deer, birds, and even the bones of men, killed by the carbonic acid gas which lies in the bottom of the valley. 'In another crater in this land of wonders,' says Sir Charles Lyell, 'the sulphureous exhalations have killed tigers, birds, and innumerable insects; and the soft parts of these animals, such as the fibres, muscles, hair, &c., are very well preserved, while the bones are corroded and entirely destroyed.' Numerous rivers flow from the north and south sides of the mountains, carrying fertility with them, and

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affording supplies to innumerable artificial water-courses used in irrigation. These streams are generally rapid, shallow, and so encumbered with sand-banks as to be unnavigable; so that only two rivers, the Solo and the river of Sourabaya, are navigable for large boats; the others are only suitable for proas or canoes of the lightest draught, or for floating down timber from the mountains.

Climate.—Java used to be esteemed very unhealthy; but it is now found that, with exception of a few marshy districts on the north coast, and some parts on the south, the climate is as salubrious as that of any other intertropical country; and the more elevated regions are even remarkably healthy. In the plains the temperature during the day is from 85° to 94° Fah., and during the night from 73° to 80°. At an elevation of 6000 feet the thermometer descends to 60°, while the tops of the lofty peaks are often covered with ice.

Vegetation.—With a temperature ranging, as above indicated, from 94° to the freezing-point, a volcanic soil plenteously watered naturally and artificially, it is not surprising that Java should be of astonishing fertility; the range of its vegetation naturally follows that of its temperature, from the palms of the tropics to the mosses of the temperate zone. The coast is fringed with cocoa-nut trees; behind them the ground rises gently to the foot of the mountain chain, and is completely cultivated. Vast fields of rice, artificially watered, distributed amphitheatre-wise on the flanks of the hills, yield often three harvests annually, though the use of manure appears not yet to have been introduced. Higher up than the rice-fields the bases of the mountains are covered with vast forests of the fig-tree tribe of different species, remarkable for their great height and vigorous growth. These are followed still higher up by the plant-like liquidambars, with their erect stems covered with parasites, also ratans and Rubiaceæ, the latter of numerous species, some of them exhaling a very fœtid odour. Along the upper limits of the liquidambars, about 5000 feet above the sea, lofty trees are still plentiful; here may be seen *Podocarpus cupressus*, with its lofty straight stem, a tree allied to the yew, and furnishing the best timber in Java; the Dammar pine, rhododendrons, laurels of numerous species, chestnuts, oaks, and several others, magnolias, myrtles, numerous orchises, &c. About 7000 feet high the vegetation changes its aspect, and mosses appear, which, with heaths, are the principal plants found on the loftier elevations. Before leaving the natural vegetation the famed poison-tree, the chettik or upas (*Antiaris toxicaria*), may be named as a noted Javanese plant. The vast forests likewise claim notice; they are 791 in number, and cover a very extensive surface in thirteen of the provinces, and consist mainly of teak. To prevent the waste which was going on government has placed them under superintendence, and draws from them a large amount of revenue.

Cultivation and Rural Economy.—Rice forms the staple food of the natives, and is raised in astonishing and increasing quantities, which, after providing for the home consumption, leave a large surplus for exportation. Coffee raised from Mocha seed is extensively cultivated, and, with sugar, forms one of the staples of the island. Cotton of two kinds, *Bombax pentandrum* and *Gossypium herbaceum*, is grown, and considerable quantities exported; and the cultivation of indigo, nutmegs, cloves, cinnamon, cochineal, pepper, pimento, tobacco, tea, and cocoa-nuts is carried on more or less vigorously, and with greater or less success. The population is almost wholly agricultural; beyond a few large towns, it is distributed over the island in villages, each governed by a native chief of its own election. Each family has its own portion of land, varying from ½ acre to 6 acres. About a third of the cultivated ground is supposed to be thus occupied. The Dutch have effected such a commutation of the imposts formerly levied by the native sovereigns as enables them to draw from the soil a large amount of valuable tropical produce for transmission to Europe. This is called 'The system of cultures,' and was introduced in 1832. A certain proportion of the land is now set apart for whatever crops, mainly coffee and sugar, the government may direct, it taking on itself the risk of failure. This forms one part of the commutation; the other is taken in labour applied to the government ground, so as that one part of the villagers succeeds another until the crop is reaped. But the system has latterly been strongly condemned in the legislative assembly of the Netherlands as unjust to the natives, and a bill has been passed whereby the forced cultivation of the sugar-cane will be totally abolished in 1890.

Zoology.—Including domestic and marine animals, 100 kinds of mammalia inhabit Java. In the west part the one-horned rhinoceros is not uncommon; and in the higher districts the royal tiger, panther, and tiger-cat keep the inhabitants in constant alarm by their depredations. The babyroussa and two kinds of wild hog form the large game of the island. There are only two species of the ape kind, but they people the forests in countless numbers. Two kinds of lemurs inspire the inhabitants with superstitious fear by their mysterious nocturnal habits; and this island may be esteemed the native seat of the largest bats, some of which measure 5 feet across the wings. They may be seen suspended from the branches in hundreds during the day, and at night they devastate the orchards and gardens. Two civets are common, and supply a perfume of which the Javanese are passionately fond; the wild ox abounds in the woods; and the buffalo is the only animal used in agricultural labour. The horses are small, but vigorous. The ornithology of Java is rich and varied, both in genera and in species; almost all the known generic groups of rapacious birds are found here in great numbers, and gallinaceous fowls are plentiful. Both the rivers and the surrounding seas supply a great variety of fish. Insects cover the grounds and plants in countless numbers; but few are distinguished for brilliancy or variety of colour, or are remarkable in form.

Manners, Customs, Religion, &c.—The Javanese are small in size, of a yellow hue; sober, patient, enduring, and easily led when convinced that the orders given are not contrary to the ancient laws and customs of the country, which are held in religious reverence. They are very susceptible of affronts, which they are not slow to avenge with the kris, which is invariably worn, and they are frequently likewise armed with the sabre or pike. In religion they are Mohammedan, a faith introduceed in the fourteenth century by the Arabians, and which has since almost entirely displaced both Hinduism and Buddhism, of both of which numerous imposing relics are to be met with in various parts of the island. The mass of the Javanese take only one wife, but people of quality and wealth take advantage of the latitude allowed by the Koran, and practise polygamy. All, without distinction, are passionately fond of gaming, more especially of cock-fighting. The Javanese are good tanners, and have made some progress in metallurgy, in carpentry, and cabinet-making. They weave and dye well; make paper from the mulberry; and many are engaged with poisoned arrows in obtaining fish, which, being salted and dried, constitute a great dainty. The great mass, however, of the people are devoted to agriculture.

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Trade and Commerce.—The trade of Java is now large, so that what was once a burdensome colony has been turned into one of the principal sources of the wealth of Holland. The great bulk of the foreign trade is carried on through the ports of Batavia, Samarang, and Sourabaya. The principal exports are rice, coffee, sugar, nutmegs, mace, cloves, tin, indigo, cinnamon, cochineal, pepper, tea (the production of which is constantly increasing), tobacco, hides, and india-rubber. For the three years 1878 to 1880 the value of the imports averaged £12,500,000; exports £15,000,000. Except rice, one-half of which is sent to Borneo and China, three-fourths of the exports are destined for the Netherlands. In 1882 the exports from Java to Great Britain amounted to £3,739,534, and the imports of British home produce from Great Britain to £1,823,155. The principal article of export to Great Britain is raw sugar. Railways have been introduced into Java, and the telegraphic communication is extensive, and is developing rapidly.

Government and Revenue.—A governor-general or viceroy is supreme ruler, with command both of the army and navy in all the Dutch provinces in the Indian Archipelago. He is assisted by the council of the Indies, composed of a vice-president and four members named by the king; and is in correspondence with the governors of the different dependencies of Java, namely, Amboyna, Borneo, Celebes, Sumatra, all of whom are under his orders. A high court of appeal sits in Batavia, and courts taking cognizance of civil and criminal cases among Europeans sit in all the principal towns. The natives are under native tribunals, superintended, in certain instances, by Europeans. Government has established schools for primary instruction at Batavia and the other principal towns, and has salaried vaccinators and medical practitioners in all the residences to attend to the wants of the natives. In 1882 the government expenditure was estimated at £12,374,969, and the revenue at £11,576,142, showing a deficit of £798,827. Such is the natural wealth of the island that for upwards of forty years the deficits have been extremely rare, and the surpluses much more frequent and considerable.

History.—Ancient Javanese history is written in the still existing magnificent remains of temples and other public buildings, which are plentifully scattered over the island. These attest that the worship of Brahma and Buddha once prevailed in the island under the splendid Hindu empire of Modjopahit; the dismemberment of which was consummated by the Arabs, A.D. 1478, by the destruction of a vast capital of that name. Islamism had previously supplanted the rival worships, and had driven their last adherents into the neighbouring island of Bali. The island then fell under the dominion of numerous petty chiefs, and was found in that state by the Portuguese, the first European settlers on the island, who arrived in 1511. They were followed, in 1595, by the Dutch, who soon eclipsed them. Though their views were at first directed wholly to commerce, the Dutch merchants, like our own East India Company, soon found it necessary to assume the position of a governing power, and treated accordingly with the native princes, with whom they were frequently at war. In 1811 Java was taken from the Dutch by the British, who, however, restored it after the Peace of 1816, since which time it has remained in their hands. Up till 1830 various portions of the island were still under native princes, who paid tribute to Holland; but in that year a revolt took place, which resulted in the whole island falling under the Dutch sway; although two provinces have been left, but only nominally, under the government of Javanese princes—Soorakarta, under its Soosoohoonan; and Djocjokarta, under its sultan. Both princes have a court, nobles, ministers, &c., but are the mere instruments of the Dutch government, by whom they are allowed handsome pensions. Since the close of this war the island has been rapidly increasing in population and prosperity. On September 20, 1859, the Dutch legislature totally abolished slavery in Java.

JAVELIN, a short and light spear thrown from the hand, and in ancient warfare used by both horse and foot soldiers. The *pilum* of the Romans was a weapon of this description, and was used either to throw or to thrust with. The *hastati* and the *principes*, who formed the first and second lines in the Roman legion, were, long before the times of Polybius, armed like the *triarii*, otherwise called the *pilani*, who formed the third line, with the *pilum*. The shaft was 4½ feet long, and the barbed iron head was of equal length, but as it extended half-way up the shaft, the whole length of the weapon was nearly 7 feet. The shaft, made of some tough wood, often cornel, was an inch in diameter. The use of the javelin was not confined to the Roman legionaries, for many barbarous tribes, and especially the Goths, employed this weapon in their military operations.

JAXARTES. See SIR-DARIA.

JAY (*Garrulus*). The jays form a genus of birds, included in the Conirostral division of the Insessores (which see) or Perchers. The place assigned to the jays by ornithologists, is that of a sub-family of the crows (Corvidæ). The sub-family of jays, is accordingly known as the *Garrulinæ*, and they are distinguished by the upper mandible or bill being notched or indented near its tip, and by the navicular or boat-like shape of the lower mandible. The bill is, on the whole, shorter than that of the crow, and is nearly straight. The head feathers are erectile, and can be elevated at will, to form a kind of crest. The wing-feathers do not extend to the tip of the tail, and the plumage is of a brilliant description. The most familiar member of the jay family is the common or European jay (*Garrulus glandarius*), which resembles an ordinary pigeon in size. The colour is a light brown inclining to red, whilst the larger or primary wing-feathers form a pretty contrast to the body colour, in being of a brilliant blue, marked out by bands of black. The blue colour reaches its highest brilliancy in the North American blue jay (*Garrulus* (*Cyanurus*) *cristatus*), which otherwise closely imitates its European representative both in size and habits. The forehead crest of the common jay is composed of white feathers with black spots, and there are black patches below the eyes, whilst the quill-feathers in the wing and tail are also coloured jet black. These birds are readily domesticated, but preserve in the same state most of their natural characteristics, and are generally restless and timid when caged. They possess a harsh grating note, but are expert mimics, and appear to imitate the voices of their feathered neighbours, even in the wild state. In captivity these imitative powers become highly developed, an especial liking appearing to exist for imitating sounds of a harsh grating character. Thus the sound of a carpenter's saw has been exactly reproduced by jays; and the barking of dogs, the various cries of the poultry-yard, the neigh of the horse, and even the mewing of the cat, have been known to be faithfully imitated by these birds. They appear to unite together in a natural state in endeavouring to expel from the woods any bird of prey which may approach: and by their harsh notes, aided by movements of offence, the jays frequently succeed in their endeavour. The owl, in particular, is subjected to persecution from the jay; although report has also credited the jay with making raids upon the nests of

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smaller and more neighbourly birds for the purpose of feasting upon the eggs. The blue or Canadian jay has especially been noted on this latter account. In Britain the jay appears to inhabit the southern districts of Scotland chiefly, but is common throughout the English counties. It feeds principally upon insects, worms, &c., but also subsists on ripe fruits and vegetables of various kinds. The eggs number five or six, and are deposited in a nest generally built on low trees or shrubs, and within a short distance of the ground.

JAY, JOHN, an eminent American jurist and statesman, was born in the city of New York, December 12, 1745. Selecting the law as his profession, in 1768 he was admitted to the bar, and in 1774 was chosen a delegate to the first American Congress, which met at Philadelphia. In 1776 he was chosen president of Congress. In 1777 he was a member of the convention which framed the constitution of New York, and the first draft of that instrument proceeded from his pen. The following year, when the government of New York was organized, he was appointed chief-justice of that state. In 1779 he was appointed minister-plenipotentiary to Spain. The objects of his mission were to obtain from Spain an acknowledgment of the independence of the United States, to form a treaty of alliance, and to procure pecuniary aid. In 1782 he was appointed one of the commissioners to negotiate a peace with Britain, at the same time that he was authorized to continue the negotiation with Spain. In conjunction with Mr. Adams and Dr. Franklin he resolved to disobey the instructions of Congress to follow in all things the advice of the French minister, who was embarrassing the negotiation with Britain, in order to benefit France at the expense of the United States. Accordingly they signed a treaty with the British minister, without his knowledge. The definitive treaty having been signed in September, 1783, he soon afterwards resigned his commission as minister to Spain, and in May, 1784, embarked for the United States. He was then placed at the head of the department for foreign affairs, in which office he continued until the adoption of the present constitution, when he was appointed chief-justice of the United States. In 1794 he was sent as envoy extraordinary to Great Britain, and concluded the treaty which has been called after his name. Before his return in 1795 he had been elected governor of his native state—a post which he occupied until 1801, when the Federal party was defeated. In that year he declined re-election, as well as a re-appointment to the office of chief-justice of the United States, and retired to private life. The remainder of his days was passed in devotion to study, particularly theological, and to practical benevolence. He died at Bedford, New York, May 17, 1829.

JAY, REV. WILLIAM, a popular Dissenting preacher, was born at Tisbury, Wiltshire, on 8th May, 1769. Having attracted, when a mere youth, the attention of the Rev. Cornelius Winter by his talents for preaching, he was received by that clergyman into the Marlborough Academy, a training institution in connection with the Congregational ministry, of which he was president. After officiating for a time as minister of Lady Maxwell's Chapel, at the Hot Wells, Clifton, he was ordained in January, 1791, pastor of Argyle Chapel, Bath, a charge which he held till a short time previous to his death, extending over a period of sixty-two years. As a preacher he acquired a most extended reputation, not only in his own denomination, but through all sections of the community. Simplicity and clearness were his principal characteristics, combined with a profundity of discernment and knowledge of the human mind which enabled him in his discourses to strike home to the hearts of his hearers. He was a voluminous writer, and a collected edition of his works, revised by himself, in twelve volumes 8vo, was published at London in 1841–47. He retired from his pastoral charge in January, 1853, and died on 27th December of same year, at the age of eighty-four.

JEDBURGH, a parliamentary and royal burgh and market town of Scotland, in Roxburghshire, 42 miles S.E. Edinburgh, beautifully situated in the valley of the Jed, here crossed by three bridges. It is embosomed among venerable orchards, and has broad clean streets and well-built houses. The principal edifices are the remains of the celebrated abbey, a magnificent structure of the twelfth century, built by David I.; the ancient castle, now converted into a prison and bridewell; Queen Mary's house, where she lived for a month in 1556; and the county and town halls. It has public and private schools, a savings-bank, corn-exchange, dispensary, and several friendly and charitable institutions. Blankets, flannels, tweeds, and other woollen fabrics, are extensively manufactured. Sir David Brewster was born in Jedburgh, and the author of the 'Seasons' received part of his education here. Jedburgh unites with Haddington, Dunbar, North Berwick, and Lauder in returning one member to the House of Commons. Pop. (1881), 3402.

JEDDAH. See JIDDAH.

JEDDO. See YEDDO.

JEFFERSON, THOMAS, the third president of the United States of America, was born April 2, 1743, at Shadwell, in Albemarle county, Virginia. He studied for two years at the college of William and Mary, Williamsburg, and then commenced the study of law under the guidance of the celebrated George Wythe. In 1769 he was elected a member of the provincial legislature from the county where he resided, and made a fruitless effort in that body for the emancipation of the slaves. By this time a spirit of opposition had been excited in the colonies to the arbitrary measures of the British government, and Jefferson co-operated zealously with the revolutionary party. In 1773 he associated himself with several of the boldest and most active of his companions in the house, with the object of exciting throughout the colonies a desire for a general congress. In Virginia a convention was assembled for the purpose of choosing delegates. Jefferson was elected a member, and a draught of instructions which he had prepared was laid on the table for perusal. Though the paper was not adopted, the convention caused it to be printed, and it procured for its author considerable reputation. June 21, 1775, he took his seat for the first time in Congress, and he was appointed a member of the committee whose report has linked the name of its author with the history of American independence. June 7, 1776, the delegates from Virginia moved that Congress should declare the United Colonies free and independent states, and a committee was appointed to prepare a declaration of independence. Jefferson was requested to draw up the paper, which he did; and it was reported to the house, after receiving a few alterations from Dr. Franklin and John Adams. It was afterwards slightly modified by the house, and after a three days' discussion, signed by all the members present but one. September 2, 1776, Jefferson retired from his seat in Congress, and on the 7th of October took his place in the legislature of Virginia, of which he had been elected a member from his county. On June 1, 1779, he was appointed governor of the state, but resigned at the end of two years. In 1781 he was appointed minister-plenipotentiary, in conjunction with others, to negotiate a peace

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then expected to be effected through the mediation of the Empress of Russia, but he declined the office. In November, 1782, Congress renewed the offer which they had made the previous year, and this time it was accepted; but the preliminary articles being agreed upon before he left the country, he returned to Monticello, and was chosen (June 6, 1783) a member of Congress. In May, 1784, Congress having resolved to appoint another minister in addition to Adams and Franklin, for negotiating treaties of commerce with foreign nations, selected Jefferson, who arrived in Paris August 6. Their efforts, however, were not very successful. In July Franklin returned to America, and Jefferson was named his successor at Paris. As symptoms of a better disposition towards America were beginning to appear in the British cabinet, he left Paris in March, 1786, and on his arrival in London, endeavoured, in conjunction with Adams, to establish friendly relations between the two governments; but after a few vague and ineffectual conferences, he returned to Paris. Towards the end of September of that year he left Paris and embarked for the United States. On his arrival there he received a letter from Washington, covering the appointment of secretary of state, under the new constitution which was just commencing its operation. Arrived in New York, where Congress was in session, he immediately entered upon the duties of his post. He continued to fill the secretaryship of state until the 31st of December, 1793, when he resigned. From that period until February, 1797, he lived in retirement. In this year he was elected vice-president of the United States, and in 1801 was chosen president by a majority of one vote over his competitor, John Adams. At the expiration of eight years he again retired to private life at Monticello, from which he never afterwards emerged. He died on the 4th of July, 1826, the fiftieth anniversary of the declaration of independence, and within the hour in which he had signed it. Jefferson was the acknowledged head of the republican party from the period of its organization down to that of his retirement from public life, and his name is one of the brightest in the revolutionary galaxy. He was a zealous cultivator of literature and science. As early as 1781 he was favourably known as an author by his Notes on Virginia. He published, also, various essays on political and philosophical subjects, and a Manual of Parliamentary Practice, for the use of the Senate of the United States. In the year 1800 the French National Institute chose him one of their foreign members. An edition of his works in nine vols. 8vo, was published at New York in 1854.

JEFFREY, Francis, a judge or lord of the Court of Session in Scotland, and one of the most eloquent pleaders as well as one of the ablest critics of modern times, was born at Edinburgh on the 23d of October, 1773; and after an education begun at the high-school of his native city, continued at the University of Glasgow, and completed in Queen's College, Oxford, passed advocate in 1794. Several years elapsed before he could obtain an adequate maintenance by his profession, and as he had no private fortune he employed his talents in literary labours. Accordingly when the Edinburgh Review was projected in 1802, he entered into it with great spirit, in common with the Rev. Sydney Smith, Lord Brougham, and others, and after two numbers had been issued, was installed as its editor, a position he held for twenty-six years. In this capacity he contributed a number of articles, about 200 in all, which at once established his own fame as a critic, and may be said to have introduced a new era in periodical literature. The severity of his criticisms brought upon him a challenge from Moore while on a visit to London, and the two opponents met at Chalk Farm and opened fire upon each other with pistols, from which their friends had considerately removed the bullets, an incident alluded to in Byron's English Bards and Scotch Reviewers. Meanwhile his profession was not forgotten, and his abilities as a pleader began to be appreciated, though his adoption of Whig opinions excluded him from all hope of official promotion. A change, however, to which he and his coadjutors in the Review in no small degree contributed, had taken place, and when the reform bill had made it impossible to treat Scotland any longer as if it were nothing better than a rotten burgh, Jeffrey began at last to reap the reward of his previous labours. Even as early as 1821 the estimation in which he was held was proved by his election to the honorary office of Lord-rector of the University of Glasgow; and in 1829 his fellow advocates had conferred upon him the highest honour in their gift, by appointing him dean of faculty. His eloquence and fluency as a public speaker made the political party to which he belonged anxious to procure a seat for him in the House of Commons. This object they attained by procuring his return for Forfar in 1830, and then, on his being unseated on petition, for Malton, one of Lord Fitzwilliam's nomination burghs, but they had not much reason to congratulate themselves on the result. His oratory, brilliant though it was, did not take, and after he had sat in the house for several years and managed the Scotch business of government, as lord-advocate under Lord Grey's ministry, he consulted both for his ease and his fame by accepting the appointment of a lord of Session, in 1834. Here he found his true vocation, and he continued during a period of sixteen years to be one of the most talented, most conscientious, and most popular judges of the supreme court in Scotland. He died at his residence, Craigcrook, near Edinburgh, on the 26th of January, 1850.

JEFFREY OF MONMOUTH. See Geoffrey.

JEFFREYS, George, lord baron Wem, commonly known by the name of *Judge Jeffreys*, was born at Acton, Denbighshire, in 1648. He was entered at the Middle Temple, and by attending an assize during the plague, when few barristers could be met with, he was allowed to plead, although not formally admitted, and continued to practise unrestrained until he attained the highest employments in the law. Soon after commencing his professional career, he was chosen recorder of London; and to this advancement and the influence it procured him may be attributed his introduction at court, and appointment as solicitor to the Duke of York in 1677. A willing instrument of all sorts of measures, his farther promotion, at such a period, was rapid, and he was appointed, successively, a Welsh judge and chief-justice of Chester, and created a baronet in 1680. When parliament began to prosecute the *abhorrers* (or church and court party, so called from their address to the king, Charles II., expressing their *abhorrence* of those who endeavoured to encroach on the royal prerogative) he resigned the recordership, and was appointed chief-justice of the King's Bench. On the accession of James II. he was one of the advisers and promoters of all the oppressive and arbitrary measures of his reign; and for his sanguinary and inhuman proceedings against the adherents of Monmouth on the 'bloody western circuit,' was rewarded with the post of lord high-chancellor (1685). His deportment on the bench was discreditable at all times in the highest degree, and he indulged in scurrility and abuse of the most degrading description. As a civil judge he was by no means without high qualifications, and in the absence of any motive to do wrong he was willing to do right, and when sober he was particularly good as a *nisi prius* judge. On

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the arrival of the Prince of Orange, the chancellor, who had disguised himself as a seaman, in order to get on board a ship unknown, was detected in a low public-house in Wapping, by an attorney whom he had insulted in open court. The latter making his discovery known, Jeffreys was immediately seized by the populace, and would have been torn to pieces, had he not been rescued by the authorities, and carried before the lord-mayor, who sent him to the lords in council, by whom he was committed to the Tower, where he died April 18, 1689.

JEHOVAH (Heb. *Yehova;* more correctly *Yahve, Yahăveh,* or *Yahăvăh,* generally rendered by the Seventy *Kyrios,* and by the Vulgate *Dominus*), the awful and ineffable name of the God of Israel, which was revealed to Moses. The pronunciation of this celebrated tetragrammaton (the name of 'four letters'), which means, *He who is, was, and will be,* or *the Eternal, Unchangeable, the Faithful* (Exod. iii. 14; vi. 3), is not known, nor is its entire signification, though it seems to contain all the tenses of the Hebrew word *to be,* and to imply, as above explained, *eternal and necessary being.* It reminds us of the inscription on the temple of Isis in Egypt—'I am whatever is, was, and will be, and no mortal has ever raised my veil.' We know that the Hebrews cherished the most profound awe for this incommunicable and mysterious name, and that this sentiment led them to avoid pronouncing it, and to substitute for it, in the sacred text, the word *Adonai,* which signifies *the lord.* This custom still prevails among the Jews, who attribute to the pronunciation of the name of the Almighty the power of working miracles, and thus explain those of Christ. The conception of the Jehovah of the Israelites differs from all other theological conceptions of that age. No image of him was allowed. He was the invisible protector and king of Israel, worshipped by obedience to his commandments, and an observance of the ceremonies instituted through Moses. The term *Jehovah* means, says Dr. Hävernick, the *revealed Elohim,* the Manifest, Only, Personal, and Holy Elohim: the latter is the Creator, *Jehovah* the Redeemer. Elohim is the abstract expression for absolute Deity, apart from the special notions of unity, holiness, substance, &c. Therefore *Jehovah* is not of the same origin as the heathen *Jove,* but of a strictly peculiar and Hebrew origin; and throughout the Pentateuch, Moses never uses that name arbitrarily for *Elohim* (though both continually recur), but is throughout consistent in the application of the respective terms.

JEHU, the founder of the fifth dynasty of the kingdom of Israel. He was a commander in the army of Jehoram, when Elisha sent one of the 'children of the prophets' to consecrate him King of Israel at Ramoth-Gilead (B.C. 895.) Immediately on his consecration he was acknowledged by the captains of the army, and set out at once to attack Jehoram, who lay ill of wounds received in battle against Hazael, king of Syria. Jehoram, in company with his guest Ahaziah, king of Judah, went out to meet the rebels, but was cowed by the denunciations of the impetuous Jehu, and turned and fled; an arrow from Jehu's bow, however, put an end to his life, and he was cast into the field of Naboth. While part of his followers went in pursuit of Ahaziah, who was mortally wounded in his flight, Jehu himself hastened on to Jezreel, where the infamous Jezebel, the queen-mother, resided. Jezebel was cast from an upper window by some of her own eunuchs on the command of Jehu, and her body was further mangled by the chariot-wheels of her enemy, and finally devoured by dogs. Jehu then entered into a work of extermination until then unparalleled in the history of Jewish monarchy. Seventy of Ahab's children were beheaded, and forty-two brothers of Ahaziah, king of Judah. He also planned a fearful massacre of the priests of Baal, but though his zeal was ardent it was scarcely consistent, for he adhered to the calf-worship of Jeroboam. In the latter years of his reign the provinces beyond the Jordan were wrested from him by the Syrians. He died after a reign of twenty-eight years. His name occurs more than once on the monuments discovered by Layard at Nineveh, where it is given as *Yehua,* the son (that is, of the family or house) of Omri.

JEISSK. See IEISK.

JEJEEBHOY, SIR JAMSETJEE, a philanthropic Parsee merchant, was born of poor parents in Bombay, on 15th July, 1783. By his energy and business talents he succeeded in achieving for himself the position of the first native merchant in India, and realizing a fortune of nearly a million sterling. The munificence displayed by him towards all benevolent and public objects, without regard to class or creed, was of the most princely kind, his donations from first to last being estimated at about £300,000. Among the benevolent institutions founded by him may be mentioned the great hospital at Bombay which bears his name, the establishment in the same city for the education of poor Parsee children, and the *dhurumsallas,* or places of refuge for travellers in various parts of the country. He also constructed the causeway uniting the islands of Bombay and Salsette, the waterworks at Poonah, the bridges at Earla, Parta, and Bartha, and other public works. He was knighted by Queen Victoria in 1842, and in 1857 was advanced to the rank of baronet. He died on the 14th April, 1859. A statue was subsequently erected in honour of him in the town-hall, Bombay.

JEJUNUM (Latin, *jejunus,* empty), the second portion of the small intestine, succeeding the *duodenum,* and so named from its generally being found empty after death. The duodenum extends to about 12 inches in length, and the jejunum forms two-fifths of the remaining portion of the small intestine. The entire length of the small intestine varies from 16 to 24 or 26 feet. For further information regarding the structure and function of the jejunum, the reader is referred to the article INTESTINE.

JELALABAD, a town, Afghanistan, near the right bank of the river, and 75 miles E.N.E. of the town of Cabul. It lies between two parallel ranges of snowy mountains, but is a wretched filthy place. Its chief claim to notice is derived from having been the scene of a successful resistance to an army of Afghans by a handful of British troops under Sir Robert Sale, in the winter of 1841–42. The British on evacuating it destroyed its fortifications.

JELETZ. See IELETZ.

JELLACHICH DE BUZIM, JOSEPH, COUNT, an Austrian general and ban of Croatia, was born at Peterwardein, 16th October, 1801. He was educated at the Theresian Military Academy in Vienna, and entered the Austrian army as sub-lieutenant in 1819. He served with some distinction on the Turkish frontier and in Italy, but it was not until the outbreak of hostilities between Hungary and Austria in 1848 that his name became famous. He had secured the confidence of the Croatians to such a degree that they requested that he should be made their ban or military commander-in-chief, a request which the Austrian emperor gladly complied with, hoping to obtain his assistance to quell the Magyar rebellion. In this he was not disappointed, for Jellachich marched an army of 40,000 well-equipped men into the revolted territory. He was, however, beaten at Ofen on the 29th September, and compelled to sue for a three days' armistice. Meanwhile Vienna itself had become revolutionized, and the fate of the

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house of Hapsburg was trembling in the balance. Under these circumstances Jellachich took the bold step of marching on the capital. It was indeed a stroke of genius, and was executed with success. Though the Hungarians were pressing close upon his rear, and the revolutionists mustered strong within the walls, he succeeded in arousing a spirit antagonistic to theirs, and may be said ultimately to have beaten them with their own weapons. His death took place in May, 1859. He not only displayed talents for government and military command, but also for poetry. A collection of his poems was published in 1850 at Vienna.

JELLY includes every translucent juice so far thickened as to coagulate when cold into a trembling mass; as the juices of acid or mucilaginous fruit, currants, &c., which, by the addition of one part sugar to two parts of juice, and, by boiling, have obtained a proper consistence. Jelly may be either of animal or vegetable origin.

1. *Animal Jelly.*—The soft parts, such as the muscles, skin, cartilage or integuments of animals, when boiled in water, yield a solution which on cooling solidifies to a tremulous jelly. The substance may also be prepared from bones by subjecting them, after crushing, to the united action of high-pressure steam and water. 70 lbs. of bones, when treated with 1 lb. of water in the form of steam, at a pressure of 4 lbs. to the square inch, and simultaneously digested in 5 gallons of water, will yield about 20 gallons of a strong jelly. Animal jelly is a colourless, elastic, transparent substance, without taste or smell, which is almost insoluble in cold but very soluble in hot water. After boiling for some time in water a solution of animal jelly loses the power of gelatinizing upon cooling; alcohol, however, still throws down a precipitate having the composition of the original substance. When moist jelly is exposed to the air it putrefies, at first becoming acid, but afterwards evolving ammonia.

Animal jelly seems to be nearly identical in composition with the tissues which yield it, so that we are unable to trace any chemical change, except, perhaps, the assimilation of water during the process of its manufacture. There is probably a rearrangement of the atoms accompanying this assimilation of water, but the subject has not yet been sufficiently studied. The following analyses show the average percentage of carbon, hydrogen, and nitrogen in animal jelly:—

	Carbon.	Hydrogen.	Nitrogen.
(1.)	49·0	7·0	18·0
(2.)	50·0	6·5	17·5

Various observers have also detected sulphur among its constituents.

2. *Vegetable Jelly.*—When the juice of fruits is heated with sugar, the liquid forms a stiff jelly on cooling. It appears from the researches of Frémy and others that unripe fruits contain a compound of carbon, hydrogen, and oxygen, called *pectose;* as the fruit ripens this substance is transformed into *pectin,* the change being brought about chiefly by the influence of a peculiar ferment called *pectase,* which is contained in the fruits. As pectin is soluble in water, the expressed juice of ripe fruits contains a large quantity of this substance, which on heating to a temperature of about 40° C. is converted into one or more substances which have not as yet been completely studied, but which have the property of gelatinizing on cooling. The principal of these substances are *pectosic* and *metapectic* acids. This latter acid, when boiled along with another strong acid, whether mineral or organic, is decomposed, one of the products being pectin sugar, a substance which is closely allied to glucose (see SUGARS), so that in all probability there is produced in the very process of manufacturing jellies more or less of this sugar, which certainly is not cane-sugar, and which might therefore be by some regarded as an adulteration. The processes which, in the living plant, result in the transformation of pectose into pectin may be imitated on the small scale by heating the juice of unripe fruit with the pulp, which contains the ferment pectase, or with a dilute acid which induces the same change as this substance. Alkalies also produce a similar effect. The exact composition of these various pectous substances yet remains a matter of doubt.

JELLY-FISHES, the popular name of the Medusidæ; often also familiarly called Sea-blubbers and Sea-nettles. Aristotle termed them Acalephæ, in allusion to the stinging properties which most of these forms possess, and from which properties their popular name of sea-nettles has also been derived. They are found frequently cast up upon our shores in the summer season, and when in the water they present a singularly beautiful appearance; each medusa resembling a clear crystalline bell, which swims gracefully through the water by alternately expanding and contracting its body. Within the bell-like body a system of canals opening from and communicating with the central mouth is to be observed. Very many of the jelly-fishes have now been ascertained to be merely the free, floating, reproductive bodies of fixed and rooted Zoophytes (*Hydrozoa*). In this view the zoological position of the jelly-fishes has been of late years widely altered, and only a few of the jelly-fishes have been retained in the order Medusidæ as specifically distinct and separate individual forms. See MEDUSIDÆ.

JEMAPPES, a village of the Netherlands, in Hainault, near Mons, on the Scheldt, celebrated as the place of the first great battle in the French revolutionary war, fought November 6, 1792, in commemoration of which, while under the French dominion, the whole department was called Jemappes. The loss of this battle by the Austrians had a great influence on the public sentiment of Europe, and gave the highest impulse to the enthusiasm of the French. The consequence of this defeat—the loss of the Netherlands and of Liége by the allies—would have been still greater if the French had not stopped their pursuit of the flying Austrian army at the Roer, instead of driving them across the Rhine. The Prussians had already retired to the Rhine after their unsuccessful campaign in 1792, when Dumouriez suddenly fell upon the Netherlands, planning the movements of his army with so much skill, and executing them with so much rapidity and decision, that the allies soon perceived that there was no want of able generals among the French. The French army was more numerous than the Austrian, which was commanded by Albert, duke of Saxe-Teschen, but the latter had the advantage of a position considered almost impregnable. The enthusiasm and martial spirit of the French, which here displayed themselves in all their intensity, bore down all obstacles, and redoubt after redoubt was stormed and taken to the chant of the Marseillaise Hymn. Dumouriez, who had appointed the young Duke of Chartres, afterwards Louis Philippe, king of France, his lieutenant, commanded the centre, Dampierre and Beurnonville the right, and Ferrand the left wing. The loss of the Austrians was estimated at 5000 men. Eight days after Dumouriez entered Brussels.

JENA, a town, Saxe-Weimar, principality of and 12 miles east of Weimar, in a valley surrounded by naked hills, on the left bank of the Saale, here crossed by a handsome stone bridge. It consists of the town proper and of four suburbs, and is a dull

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antiquated place. It is the seat of several courts of law, one of them a superior appeal court for the Saxon duchies and the principalities of Reuss, and contains a Roman Catholic and several Protestant churches, a castle in which one of the collateral branches of the Weimar family long resided, and several hospitals. But it is to its university, and to the battle fought here in 1806, that Jena is indebted for any celebrity which it possesses. The university was opened in 1558, and attained its highest prosperity towards the end of the last century, when it numbered Schiller, Humboldt, Fichte, Schelling, and Griesbach among its teachers, and was attended by above 1000 students. In 1844 the number had dwindled down to 411: the present average attendance is about 700–800. It is a very complete establishment; has sixty-five professors and instructors, who teach the different branches of law, medicine, philosophy, and theology; and possesses an anatomical theatre, botanical garden, observatory, good physical and chemical cabinets, and a library of 200,000 volumes. Pop. of town, 10,337. The battle of Jena was fought 14th October, 1806, between the Prussians under Prince Hohenlohe and the French under Napoleon. The prince allowed the French to occupy the steep eminences which command the valley of the Mühl, and his army gave way on all points: first the vanguard under Tauentzien, then the main body led by himself, and lastly the right wing under Ruchel. On the same day Davoust gained the equally decisive victory at Auerstädt, and the double defeat laid Prussia at the feet of the conqueror.

JENNER, Edward, an English physician, celebrated for having introduced the practice of vaccination as a preventive of the small-pox. He was the youngest son of the vicar of Berkeley in Gloucestershire, and was born there May 17, 1749. Being destined for the medical profession, he was, after a common school education, placed as an apprentice with a surgeon at Sodbury, in his native county. He subsequently visited London to finish his studies by attending the lectures of the celebrated anatomist John Hunter, in whose family he resided for two years. Returning to the country, he settled at Berkeley, to practise the various branches of his profession. He had already obtained the reputation of an ingenious practitioner, and a man of talent and science, when he made known to the world the important discovery which has raised him to an enviable situation among the benefactors of the human race. His investigations concerning the cow-pox were commenced about the year 1776, when his attention was excited by the circumstance of finding that some individuals to whom he attempted to communicate the small-pox by inoculation were not susceptible of the disease; and on inquiry he found that all such patients, though they had never had the small-pox, had undergone the casual cow-pox, a disease common among the farmers and dairy-servants in Gloucestershire, who had some idea of its preventive effect. Other medical men were aware of the prevalence of this opinion, but they treated it as a popular prejudice; and Jenner seems to have been the first who ascertained its correctness, and endeavoured to derive from it some practical advantage. He discovered that the *variolæ vaccinæ*, or cow-pox, as the complaint has been since termed, having in the first instance been produced by accidental or designed inoculation of the matter afforded by a peculiar disease affecting the udder of a cow, could be propagated from one human subject to another by inoculation, rendering all who passed through it secure from the small-pox. He made known his discovery to some medical friends, and in the month of July, 1796, Mr. Cline, surgeon to St. Thomas' Hospital, introduced vaccination into the metropolis. The practice of vaccine inoculation was adopted in the army and navy, and honours and rewards were conferred on the author of the discovery. The diploma constituting him Doctor of Medicine was presented to Jenner as a tribute to his talents by the University of Oxford. He was chosen a fellow of the Royal Society and of other learned associations, and in 1802 a parliamentary grant was made to him of the sum of £10,000, and five years later a second grant of £20,000. The extension of the benefits of vaccination to foreign countries spread the fame of the discoverer, who received several congratulatory addresses from continental potentates. He died of apoplexy, January 26, 1823, and was interred in the parish church of Berkeley. Dr. Jenner was the author of an Inquiry into the Causes and Effects of the Cow-pox (1798, 4to), and Farther Observations on the Variolæ Vaccinæ or Cow-pox, besides various letters and papers on the same subject, published in periodical works. See Vaccination.

JENYNS, Soame, a witty and elegant writer, was the only son of Sir Roger Jenyns, Knight. He was born in London in 1704, and received a domestic education until the age of seventeen, when he was entered a fellow commoner of St. John's College, Cambridge, where he remained three years. In his youth Jenyns sustained the character of a beau, and his first literary performance was a poem on the Art of Dancing, published in 1728. In 1741 he was left, by the death of his father, master of a large fortune, on which he entered into public life as representative of the county of Cambridge. He began his career by supporting Sir Robert Walpole, and ever after remained a faithful adherent to the minister for the time being. In 1757 he published his Free Inquiry into the Nature and Origin of Evil, the fundamental principle of which is that the production of good without evil is impossible; that evils spring from necessity, and could not be done away without the sacrifice of some superior good, or the admission of greater disorder. In respect to moral evil his theory is that it is permitted in order to provide objects for the just infliction of physical evils. In 1776 appeared his View of the Internal Evidences of the Christian Religion. The foundation of his reasoning is that the Christian religion is a system of ethics so superior to, and unlike anything which had previously entered into the mind of man, that it must necessarily be divine. In 1782 appeared his Disquisitions on Various Subjects (8vo), which are marked with his usual characteristics of sprightly wit and shrewd observation, but are vague and declamatory. He died in 1787.

JEPHTHAH, a natural son of Gilead, who, being driven from home by his brothers, lived in the land of Tob, but when the Ammonites waged war against Israel was sent for to defend his countrymen. Jephthah tried conciliatory measures, but being unsuccessful in this, he put himself at the head of the Israelites, and defeated the enemy. Having rashly made a vow that if he was victorious he would sacrifice to God as a burnt-offering whatever should first come to meet him from his house, he was met on his return by his daughter, his only child, whom he sacrificed, in consequence, to the Lord (Judges xi. 29, 40). The mode in which the sacrifice was performed has given rise to much controversy, some authors maintaining that Jephthah put her to death near the altar; others that he devoted her to perpetual virginity in the temple; others, and most commentators, think that he actually sacrificed her as a burnt-offering, and that though prohibited by the law of Moses, human sacrifices may nevertheless have occasionally taken place among the Jews at

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this period. Jephthah ruled six years as a judge and general (Judges xi. xii.)

JERBOA. The jerboas, constituting the family Dipodidæ, are found chiefly in Asia and Northern Africa, but a few species occur in Russia and North America. They are mammals belonging to the order Rodentia or Gnawers, and are thus primarily distinguished, like rats, mice, and other allied forms, by the chisel-like structure of the front or incisor teeth. The average length of the body is about 8 inches, the tail often measuring 10 inches. The colour of the upper body is a pale fawn inclining to yellow, the lower parts being white. A peculiar and characteristic feature of the jerboas consists in the great disproportion between the length of the fore and hind limbs; the latter members being extremely elongated by the great development of the metatarsal bones, or those which correspond to the instep in man. In consequence of this conformation of the hind legs the jerboas progress by leaps and hops, in a similar fashion to the kangaroos, to which animals indeed, as well as to the chinchillas, they bear a close resemblance in outward form, although of course they are much smaller than the Australian mammals. The hind feet are provided with three toes each, the fore limbs being terminated with four toes armed with short but powerful nails or claws, of service to these animals in excavating the burrows in which they live. Well-developed collar-bones or clavicles exist in the jerboas, and the other characters of the family are found in the possession of a long cylindrical tail, whilst the nose is provided with bristles. The eyes are large, and the ears prominent. The animal in leaping differs from the kangaroos in that it rests upon the toes of the hind feet, whilst the kangaroos rest upon the lower surface of the ankles. The burrows are excavated in sandy or clayey ground, and are of considerable length, extending in a winding and oblique manner from the opening of the nest, which is situated about half a yard below the surface of the ground. A second passage to the surface of the ground, through the nests or passages of neighbouring jerboas, is generally made, and by this latter opening these forms make a speedy exit when threatened with danger through the chief entrance. The Arabs, in trapping the jerboas, the flesh of which they esteem a delicacy, take care to stop up the entrances or outlets of the different nests of the colony except one, through which the community is attacked, and its members secured alive. As thus indicated, the jerboas are gregarious and live in colonies, the burrows of the different families communicating with each other. They are nocturnal in habits, and hybernate throughout the colder seasons of the year. The progressive leaps of the jerboas carry them along quickly and effectively, and in thus moving they leap from one side to the other in zigzag fashion. The tail in leaping is extended in a straight line behind the body; but in sitting or when at rest it is curved in the shape of the letter S, the lower curve of the tail touching the ground. The food of the jerboas chiefly consists of roots, which they dig by aid of their claws. When tamed —a process to which they submit with docility— their food may be partly carnivorous, as when domesticated they have been found to eat raw meat. The jerboa has been regarded as corresponding to the Scriptural *coney;* but this is an erroneous supposition, as the *Hyrax* of Syria more nearly corresponds to the biblical form. The most familiar species of jerboas is the Egyptian form (*Dipus Ægyptius*), found in North Africa in arid places. The jumping hare of South Africa (*Pedetes Capensis*), and its ally the jumping mouse (which see) of North America (*Meriones Hudsonicus*), are also well-known examples of the family. The Gerbilles (*Gerbillus*) of Africa and India are included by most authors in the Dipodidæ; and the smallest species of the family is the *Dipus monotarsus*, the average length of which is about 3½ inches.

JEREMIAH, the second of the great prophets of the Old Testament, is described as the son of Hilkiah, of the priests that were in Anathoth, a town about 3 miles from Jerusalem. He flourished during the darkest period of the Kingdom of Judah, under Josiah, Jehoahaz, Jehoiakim, Jeconiah, and Zedekiah. He was called to the prophetic office in his youth, in the thirteenth year of the reign of Josiah (B.C. 629), and continued in it till the eleventh year of Zedekiah, when Jerusalem was taken by Nebuchadnezzar (B.C. 588). His life was one long martyrdom; it was his task to deliver his mournful messages and warnings to a thoroughly corrupted people and to foretell the speedy destruction of the nation. In Judah there were in his time two political parties—the one favouring an Egyptian alliance, the other a Chaldean. Jeremiah repudiated both at first, but by the course of events was driven over to the latter party, which was decidedly the unpopular one. He characterized Nebuchadnezzar as the servant of God, and prophesied the approaching burning of the temple. A cry for his life arose from the priests and prophets, and he escaped with difficulty. At last the fatal seventh day of the fifth month came round, when Jerusalem with its temple and palace was consumed with fire. Jeremiah was favourably treated by the Babylonian conqueror, and offered a home at Babylon, but he preferred to stay among the wretched remnant of the people left in Judah. An influential section of this party thought they saw in Egypt a safe place of refuge from the power of Nebuchadnezzar, and led the rest of the people, Jeremiah among the rest, to a place called Tahpanhes, where, according to Christian tradition, the prophet was stoned to death by his countrymen, who were irritated by his rebukes. According to the Rabbinical tradition, however, he and his disciple and secretary Baruch made their escape on the conquest of Egypt by Nebuchadnezzar to Babylon or Judah, and died in peace.

The prophecies of Jeremiah, which were dictated to Baruch, have been arranged with little regard to chronological order, and the text is in a somewhat confused state, notwithstanding two revisions by the prophet himself. In the present order we have two great divisions: (1) Chap. i.–xlv., prophecies delivered at various times, directed chiefly to Judah, or connected with Jeremiah's personal history; (2) Chap. xlvi.–li., prophecies connected with other nations. Chap. lii., taken largely from 2 Kings xxv., may be meant as a supplement to the prophecies or as an introduction to the Lamentations. Jeremiah wants the dignity and splendour of Isaiah, but exhibits great tenderness and elegiac beauty of sentiment. The book of Lamentations is a pathetic poem made up of five distinct elegies. According to Josephus it was written on the death of King Josiah, but later authorities regard it as the utterance of the prophet's sorrow upon the capture of Jerusalem and the destruction of the temple. Several of the Psalms have been attributed to him, especially by modern critics. Hitzig sets down thirty-four as being the composition of Jeremiah.

JER-FALCON. See FALCON.

JERICHO, a considerable town of ancient Judea, on a plain north-east of Jerusalem, on the west of Jordan, noted, especially in Solomon's time, for its balsam-gardens and its thickets of palm-trees and roses, and carrying on a flourishing trade in balsam and spices. It was the key of Palestine, and was

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therefore invested by the Israelites, who had passed the Jordan under Joshua to conquer this country. On the seventh day it was taken in a miraculous manner, and destroyed, but was rebuilt some time after. Its site is now occupied by the village of Riha. The gardens and thickets have disappeared; fig-trees, balsam-trees, maize, and cucumbers may be said to comprise all that is now cultivated.

JERKED BEEF, beef cut into strips of about an inch thick, and dried in the sun. This method of preserving meat has been largely adopted in Chili, and other parts of South America, and has been tried in Australia. Cut from the animals when in good condition these strips of flesh dry in the sun before decomposition commences, and will keep for any length of time. It is called by the Chilians *charqui* (of which the English name is a corruption), and is sent in large quantities to Cuba, where it is cooked for the negro. Several shipments have been sent to England from Australia.

JEROME, St. (Eusebius Hieronymus Sophronius), one of the most learned and prolific authors of the early Latin Church, was born sometime between 331 and 345 in Dalmatia, of wealthy parents, educated with care in literary studies, and made familiar with the Roman and Greek classics under the grammarian Donatus at Rome. But he did not escape uncontaminated by the licentiousness of the capital; and he himself confesses the excesses of his youth. He soon, however, became inclined to the Christian faith. The catacombs and tombs of the martyrs first excited his devotion. His travels on the Rhine and in Gaul made him acquainted with several Christian preachers, and before his fortieth year he was baptized in Rome. After a long residence at Aquileia he went in 373 to Antioch in Syria, where his inclination to an ascetic life became more decided. In 374 he retired to the deserts of Chalcis, and there passed four years as a hermit in the severest mortifications and laborious studies. He left his solitude again to be ordained presbyter at Antioch. He did not, however, confine himself to the discharge of the duties of this office, but soon after went to Constantinople to enjoy the instruction of Gregory of Nazianzen. In Rome, whither he accompanied his friend the bishop Damasus, he made his appearance as a teacher. His exposition of the Holy Scriptures found favour with the Roman ladies; and although no one reprehended more than he the manners of the fashionable world, several matrons of distinction, with their daughters, complied with his exhortations, and became nuns. St. Marcella and St. Paula are celebrated for the learned and ingenious theological epistles he wrote them, and for their rare monastic piety. Paula accompanied him to Palestine in 386, where he founded a convent at Bethlehem with her funds and in her society: in this he remained till his death in 420. His writings show his active participation in the controversies concerning the doctrines of Origen, Melctus, and Pelagius; he always defended with zeal and ability the orthodox doctrines of the church, though his own writings are not free from the vestiges of the views and opinions of these different parties. His profound knowledge of the Bible, which he read in the original languages, frequently led him to results on which he subsequently had controversies with the church; and his method of interpreting the Scriptures borders closely on the allegorical interpretations of Origen, whom he respected, studied, and attacked. His Biblical labours are highly valuable; his Latin version of the Old Testament from the original language is the foundation of the Vulgate, and his commentary gave a new impulse to the study of the Holy Scriptures. In the controversy with Jovinian and Vigilantius, the opponents of the ascetic bigotry, his immoderate zeal for the monastic life, which contributed much towards the promotion of this new institution, led him to expressions which manifest more strength and fire of feeling than maturity of judgment. On the whole, with a glowing imagination, which made his style lively and attractive, and with an extensive knowledge of languages, he possessed a less philosophical genius than his more celebrated contemporary Augustine.

JEROME OF PRAGUE, of the family of Faulfisch, born some time about 1360–70, educated at the universities of Prague, Paris, Oxford, Cologne, and Heidelberg; in faith and sufferings the companion of the famous John Huss, whom he excelled in learning and eloquence, and to whom in the bold attempt at reformation of the fifteenth century he was inferior only in moderation and prudence. His reputation for learning was so great that he was employed by Ladislaus II. of Poland to organize the University of Cracow; and Sigismund of Hungary caused Jerome to preach before him in Buda. The doctrines of Wycliffe which he introduced into his preaching subjected him to a short imprisonment by the University of Vienna; but he was released on the recommendation of the people of Prague. He now took a zealous part at Prague in the contest of his friend Huss against the abuses of the hierarchy and the dissoluteness of the clergy, and not unfrequently proceeded to violence. He attacked the worship of relics with ardour, trampled them under foot, and caused the monks who opposed him to be arrested, and even had one thrown into the Moldau. He publicly burned in 1411 the bull of the crusade against Ladislaus of Naples, and the Papal indulgences. When Huss was imprisoned in Constance he could not remain inactive, and hastened to his defence. But a public letter in which he requested a safe-conduct from the Council of Ueberlingen was not satisfactorily answered, and on his attempting to return to Prague the Duke of Sulzbach caused him to be arrested in Hirschau and carried in chains to Constance. He here received in prison information of the terrible fate of his friend, and after several hearings, in which no one was able to oppose him, an imprisonment of half a year had so worn him down that he consented on the 11th September, 1415, to recant the heresies with which he and Huss were charged. But this apostasy did not deliver him, and after languishing a year, without being able to see or read in the darkness of the dungeon, he displayed his former courage on an audience on the 26th May, 1416. He solemnly retracted his recantation, avowed that none of his sins tormented him more than his apostasy, and vindicated the principles of Huss and Wycliffe with a boldness, energy, and eloquence that extorted the admiration of his adversaries, but, nevertheless, precipitated his destruction. May 30 he was burned at the command of the council. He proceeded to the pile, consoled by singing the apostles' creed and spiritual hymns, and gave up his spirit in prayer. His ashes were thrown into the Rhine in order to annihilate his memory.

JERROLD, Douglas, a distinguished dramatist and popular writer, was born on 3d January 1803, and was the son of the manager of the Sheerness theatre, in which town he spent his boyhood, and became early familiar both with the stage and seafaring matters. At school he was rather regarded as a dull boy, and having, in opposition to the recommendations of his father, chosen the sea as his profession, entered as midshipman on board H.M.S. *Namur*. Peace, however, was concluded shortly after, and Jerrold, quitting the service, was bound

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apprentice to a printer in London, Laman Blanchard being then in the same establishment in a similar capacity. Between the two young men a close friendship sprang up. Though engaged close at work from morning to night, Jerrold set himself to the task of self-education, and by rising early and sitting late made himself master of Latin and Italian, besides acquiring an extensive knowledge of general literature. He likewise began to exercise himself in original composition, one of his first successful attempts being a critique on the opera of Der Freischütz, which he dropped into the editor's box of the journal on which he was engaged as printer, and the following morning was agreeably startled by his own manuscript being placed in his hand to be set up for the press. Having made the acquaintance of the editor, he soon obtained literary employment. The bent of his genius, however, lay mainly in the direction of dramatic writing. Numberless pieces were produced by him before he was twenty, but the first which won decided popularity was the play of Black-eyed Susan, represented for 300 successive nights at the Surrey Theatre, under the management of Elliston. It retrieved the fortunes of the manager, who, however, pocketed the lion's share of the profits, the author receiving only about £70. Jerrold's subsequent dramas were the Rent-day; Nell Gwynne; the Housekeeper; the Prisoner of War; Bubbles of a Day, and Time Works Wonders, the former one of the wittiest and the latter one of the most successful comedies on the English stage; St. Cupid, a piece first produced at Windsor Castle; the Catspaw; the Heart of Gold, and several others. He likewise contributed extensively to periodical literature, founding and conducting successively the Illuminated Magazine and Douglas Jerrold's Shilling Magazine, and also acting as a most important member of the literary staff of Punch. To the last-named paper he contributed his inimitable Mrs. Caudle's Curtain Lectures, Punch's Letters to his Son, the Story of a Feather, &c. In the latter years of his life he became editor of Lloyd's Weekly Newspaper, which he both raised in character and in circulation. He expired after a few days' illness from disease of the heart, at his residence, Greville Place, Kilburn Priory, near London, on 8th June, 1857. Though a powerful master of satire, he never allowed the shafts of his wit, whether as an author or in private life, to be empoisoned with malevolence. In the domestic circle, and in all friendly and social relations, his sterling qualities rendered him alike beloved and respected. A pension of £100 per annum was granted by government after his death to his widow.

JERSEY, one of the Channel Islands, belonging to Great Britain, the largest and most valuable of the group, about 15 miles off the north-west coast of France; greatest length, east and west, about 12 miles; greatest breadth, 7 miles; area, according to the admeasurement of the Ordnance Survey, 28,717 acres or 44·87 square miles. Its coast, particularly on the north, is extremely rugged and precipitous, and is formed by the waves into the most fantastic and picturesque shapes. It is deeply indented all round, and has a number of good bays and harbours, the chief of which are St. Aubin, St. Catherine, Granville, St. Helier, and St. Brelade; that of St. Ouen on the west, being open to the strong influx of the Atlantic Ocean, forms unsafe anchoring ground. Granitic rocks, in some localities overlaid by schists, are the principal formation; and in the centre of the north coast syenite, of a flesh colour, abounds, which is susceptible of a high polish. The interior of the island is fertile, and intersected by deep beautiful valleys. It is abundantly wooded, and has, altogether, a singularly rich and picturesque appearance. The climate is peculiarly mild and agreeable, the mean annual temperature being 52° Fah. Agriculture has in recent years greatly advanced. Land brings a high rent, and holdings do not, on an average, exceed 15 to 20 acres; resulting from the operation of the Norman law respecting the equal division of property. Wheat is the principal cereal raised: besides which a little barley is grown. Potatoes and parsnips are extensively cultivated, particularly the former, which are largely exported; and various fruits attain the utmost perfection, including pears, melons, strawberries, peaches, and apricots. Cider, of which about 2000 hogsheads are exported annually, is one of the principal products; a considerable portion of the land being laid out in orchards. Cows of the famous Jersey breed are reared and exported in great numbers, but sheep are comparatively neglected, owing to the limited extent of pasturage. The horses are small, but well qualified for the work required of them, and the breed has latterly been much improved. The trade of Jersey is very considerable and increasing, owing to the particular privileges its inhabitants enjoy, especially their almost total exemption from taxation, they being allowed to export their own produce to England, subject only to the same duties imposed on the produce of Great Britain, and to the absence of import duties. The exports to England consist chiefly of granite, cattle, butter, fruit, potatoes, and oysters; of the last of which considerably upwards of 200,000 bushels have been shipped yearly. The imports consist chiefly of woollen fabrics, hardwares, and cutlery; glass, soap, earthenwares, &c. Ship-building is carried on to a small extent in Jersey. There are but few manufactures, and these are principally for the supply of local requirements. Jersey has its own legislature: the 'States,' consisting of the governor and the bailie of the Royal Court, both appointed by the crown; the twelve judges of the Royal Court, elected for life; and the rectors of the twelve parishes, and twelve constables, elected every three years by the ratepayers. Appeals lie to the queen in council. The lower classes speak a sort of old Norman French dialect, while the upper classes speak French, which is also the language of the law courts, although English suitors may address the court or examine witnesses in English. The island is divided into twelve parishes, and is attached to the diocese of Winchester. Principal town, St. Helier, situated on the south-west side of the island. Pop. in 1881, 52,455.

The Channel Islands were held in the third and fourth centuries by the Romans, Jersey being named by them Cæsarea. The islands were captured by the Northmen under Rollo, and thus became an appanage of Normandy, and were united to the crown of England by his descendant William the Conqueror. The inhabitants of Jersey preferred to cast in their lot with the English on the conquest of Normandy by Philip Augustus, and while retaining the laws, customs, and in a great measure the language of their continental ancestors, have always remained firm in their allegiance to England. Almost every war with France has been characterized by an attack upon Jersey, the most formidable being those under Du Guesclin in 1374, and in 1781 under the Baron de Rullecour. It has long been a favourite haunt of French refugees, the most famous being Chateaubriand and Victor Hugo, who has made its scenery familiar to the readers of the present generation.

JERSEY, New. See New Jersey.

JERSEY CITY, a town in the United States, capital of Hudson county, New Jersey, right bank of the Hudson, opposite New York, from which it is about a mile distant and with which it is connected

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by ferries. Generally it is regularly laid out, with broad streets at right angles to each other, and is a well-built town. Among the public buildings may be mentioned the city hall, the court-house and jail, various churches, and the public schools. The manufacturing establishments are very numerous, and comprise glass works, works for the production of articles in metal, as boiler works, foundries, steel works, locomotive works, &c.; breweries, sugar-refineries, chemical works, watch works, crucible works, &c. By railway Jersey City is directly connected with all the northern, southern, and western railway systems of the United States, and being also at the terminus of the Morris Canal carries on a large trade, great quantities of coal and iron in particular being brought to it. Steamers can always leave the port for Europe without being obstructed by ice. Pop. (1880), 120,728.

JERUSALEM (Arabic *El-Kuds*, 'The Holy'), one of the most ancient and interesting cities in the world, situated in Asiatic Turkey, in Palestine, in the pashalic of Damascus, and 126 miles S.S.W. of that city, at the height of 2500 feet above sea-level. The district in which it stands has a rugged and somewhat sterile appearance, being composed of a series of ridges of limestone, intersected by narrow and precipitous ravines. In many places the rock is seen piercing the surface in blocks and patches, almost devoid of any covering of soil; and though the olive evidently thrives well, and much ground is under regular culture, vegetation is, on the whole, by no means luxuriant. The site of the city itself is well defined. A broad swell of ground, almost on the line of water-shed between the Mediterranean and the Dead Sea, descends with considerable rapidity to the east, and then terminates on the precipitous edge of a ravine called the Valley of Jehoshaphat. A similar ravine, called the Valley of Hinnom, commencing in the west, runs first south and then east till it unites with the former. Jerusalem occupies the greater part of the space included within the fork of these two ravines. The space, however, is not continuous. A valley, less precipitous than the two already mentioned, and called the Tyropœon or Valley of the Cheesemakers, traverses it nearly from north to south, and divides it into two nearly equal portions; while these portions are again subdivided by two minor transverse valleys; thus forming in all four distinct ridges or hills—Zion on the south-west, Acra on the north-west, Moriah on the south-east, and Bezetha on the north-east. The bottom of the Valley of Jehoshaphat forms the bed of the brook Kedron, which flows only in the rainy season; and on the opposite side of it, on the east, rises the Mount of Olives, overlooking the city, and commanding the finest view of it. To the south of the Mount of Olives, and properly a continuation of it, is a hill called the Mount of Offence. On the south of the Valley of Hinnom is another called the Hill of Evil Counsel; and considerably to the north, beyond a west sweep of the Valley of Jehoshaphat, a series of lofty eminences are conspicuous; and thus, on all sides except the west, Jerusalem may be truly said to be encompassed by mountains. In ancient times, when the city was in its greatest glory, not only were the four hills of Zion, Acra, Moriah, and Bezetha, but also a considerable space both to the north and west of them, included within its walls. The actual walls are of more limited extent, and have only a circuit of 2½ miles. They were built by the Turks about three centuries ago, partly on the site and for the most part with the materials of the ancient walls; and following the inequalities of the ground, have a height varying from 20 feet to 50 feet. They are composed of hewn stones, some of which, particularly in the lower parts, where the original walls appear to have been left untouched, are of enormous magnitude; surmounted by a battlemented and loop-holed breastwork, and flanked at intervals by massive towers. The east wall stretches, nearly in a straight line, from south to north, along the edge of the Valley of Jehoshaphat, and has, nearly in its centre, a gate—called by the Franks St. Stephen's, and by the Mohammedans Bâb-es-Sabat ('Gate of the Tribes')—leading down to the brook Kedron, and across it to the Mount of Olives and to Bethany. The north wall runs at first nearly due west, and then curves gradually round in a W.S.W. direction till it reaches a second gate—called by the natives Bâb-el-Amud ('Gate of the Pillar'), and by the Franks the Gate of Damascus, because it is in the line of the great road leading to that city and to the other important towns in the north. The west wall is very irregular. Commencing at the gate now mentioned, it proceeds first in a S.S.W. direction, then winds round a prominence which juts out considerably to the west, and then runs irregularly in a S.S.E. direction along the west side of Mount Zion. In this wall, immediately south of the prominence, is a third gate, called the Jaffa, Bethlehem, or Hebron Gate; because, on issuing from it, two roads branch off, one west to the first, and another south to the last two of these cities. The west wall originally was continued south to the abrupt termination of Mount Zion, above the Valley of Hinnom. At present it stops short considerably to the north of its ancient termination, and is succeeded by the south wall; which, after running a short way due east along Mount Zion, is continued in an E.N.E. direction across the Valley of Tyropœon, and thence upward by Mount Ophel, forming the south part of Mount Moriah, to its junction with the south-east corner of the east wall. A considerable part of Mount Zion, which was wholly included within the ancient, is thus excluded from the modern city; and being mostly under regular culture, presents a remarkable fulfilment of the prediction that Zion should become a ploughed field. In this south wall there is a fourth gate, called the Gate of Zion; but it merely leads out to the adjacent parts of the mount, and is not in the line of any thoroughfare. Besides these four gates still open, are other four which have been built up; and on the west side, near Bethlehem Gate, advantageously situated on the highest part of Mount Zion, is a citadel, called also David's Castle and the Tower of Hippicus, surrounded by strong walls, flanked with towers. This fortress, the massive structure of the walls, and the precipitous ravines along which they are partly built, must have made Jerusalem capable of offering a very powerful resistance when attacked by any of the ancient modes of warfare; but a besieging army, with regular artillery, by occupying the hills which command it, more especially the Mount of Olives, could easily force it to submit.

The interior of the city is not attractive. A large part of it is occupied by mosques, churches, and convents; and the number of inhabited houses being, in consequence, comparatively small, there is a great want of animation in its streets. The houses, too, though built of stone, and for the most part very substantially, with flat roofs, from which numerous small domes rise, present in most cases no windows to the streets, which accordingly—generally narrow, ill paved, and sloping to the centre—are merely long lanes with dead walls on each side of them. One of the best known of the 170 streets is the Via Dolorosa, so named because our Saviour is said to have borne his cross up it when about to be crucified. It runs from west to east across the hill of Acra, and then, after a short turn to the north, is again continued east be-

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tween the hills of Bezetha and Moriah to St. Stephen's Gate. Another principal street proceeds in a direction nearly parallel to the former, from the Jaffa or Bethlehem Gate east, between the hills of Acra and Zion, to the bazaar; and then, after a short turn south, again east to the hill of Moriah. Nearly at right angles to these two streets is one which proceeds from the Gate of Damascus south, in the line of the bazaar, and almost through the centre of the city, and is only terminated at the south wall, east of the Gate of Zion. This street, and more especially the part of it occupied by the bazaar, the shopkeepers in which are mostly Christian, is the greatest thoroughfare, and the only one in which a spirit of activity is seen.

The public buildings are numerous, and, either by themselves or their inclosures, occupy the far larger part of the space within the walls. The largest of these inclosures is that of Moriah, now called by the Mohammedans El-Haram Esh-Sherif ('The Noble Sanctuary'). It is in the form of a regular parallelogram, surrounded on all sides by a lofty wall. This wall on the east, and for nearly two-thirds of its length on the south, is the same as that of the city; and the whole inclosure is deemed so sacred, that few but Mohammedans are permitted to enter it, Christians being rarely admitted. Its area is computed at one-eighth of that of the whole city, and, where not built upon, is laid out as a beautiful lawn, planted sparingly with olive, cypress, and other trees. The most conspicuous building is the Mosque of Omar, called also Kubbet-es-Sukhrah ('Dome of the Rock'), a splendid structure of an octagonal form, situated near the centre of the area, on an elevated terrace, approached by four porticoes, one of them with an elegant marble colonnade, lighted by forty-eight windows of stained glass, and surmounted by a magnificent dome. This mosque occupies the site, and is understood to contain some remains, of the Jewish temple. Another mosque, called El Aksa, also a magnificent structure, and supposed to have been originally a Christian church, covers a large space in the southern part of the inclosure. On the opposite side of the city, on the northern brow of Acra, and a little south of the Via Dolorosa, is the Church of the Holy Sepulchre, so called because alleged to contain under its roof the very grave in which our Saviour lay. The accuracy of the allegation unfortunately is more than doubtful; and the hallowed feelings which the very idea of standing on such a spot is fitted to produce, are rudely disturbed by the mummeries and impostures which are continually practised at it. The church, built in the Byzantine style, was erected by Helena, the mother of Constantine the Great; and, though not possessed of much architectural merit, is remarkable for the richness of its decorations, and the number of pilgrims by whom it is visited. The other buildings of greatest note within the city are the convents. Immediately west of the Church of the Holy Sepulchre, and only separated from it by a street, are the Greek and Coptic convents. The Latin convent, situated further to the west, and partly inclosed by the western wall, is a large and massive structure, with extensive courts and gardens, and is the place where European visitors usually take up their abode. The Armenian convent, built on a still more extensive scale, and capable of accommodating 1000 pilgrims, is finely situated on Mount Zion, in the angle formed by the junction of the western with the southern wall. Immediately to the east of it is a chapel, said to mark the site of the house of Annas. Considerably to the south-west, and immediately outside of the southern wall, opposite to the Gate of Zion, another building, with an Armenian convent adjoining, is pointed out as the house of Caiaphas. Still farther south on the mount, and forming one of the most conspicuous objects which Jerusalem presents when approached from the south, is a lofty mosque, said to be erected over the tomb of David. The traditions which fix these localities are of very doubtful authority; but the vicinity presents various other localities, better authenticated, and possessing at least equal interest. Among them may be mentioned Aceldama, or the Field of Blood, purchased as a strangers' burying-ground by the money which Judas had received for his treachery, and situated on the southern edge of the Valley of Hinnom; the Pool of Siloam, situated near the junction of the three valleys of Hinnom, Tyropœon, and Jehoshaphat; the Pool of Bethesda, close to the eastern wall, near St. Stephen's Gate; and the Garden of Gethsemane, situated at the foot of the Mount of Olives, on the eastern side of the brook Kedron, and still containing venerable olive-trees, evidently of such ancient growth, that their existence at the time of our Saviour's agony is, to say the least, not impossible. Within the last twenty years or so a considerable improvement has taken place in the appearance and prosperity of the city. Hotels in which all modern conveniencies and comforts may be enjoyed have been erected for the hosts of pilgrims and travellers who annually visit the place. The surrounding country, too, has been greatly improved; and within these few years back, numerous researches have been made under the auspices of the Palestine Exploration Fund which promise to be of great historical importance.

Jerusalem, if identical, as many have supposed, with Salem, where Melchisedec reigned, must have existed about 2000 years before the Christian era; but it is not mentioned by its own name till about B.C. 1500, when it was in the hands of the Jebusites, and the lower part of the city was wrested from them by the prowess of Joshua. The upper part, however, continued in their possession till the time of David, who, having succeeded in finally dislodging them, took up his residence in the stronghold of Zion, and made Jerusalem the capital of his kingdom. Under him it rose rapidly in importance, and received numerous embellishments; but these were all eclipsed by the more magnificent structures of Solomon, whose crowning work was the erection of a temple more gorgeous than any which the world had previously witnessed, and infinitely distinguished above them all by its possession of a visible symbol of the divine presence. The rash proceedings of his successor, Rehoboam, and the consequent revolt of ten tribes, must have shorn Jerusalem of much of its glory; but it still continued for several centuries to take precedence as one of the most distinguished cities of the East. At length, having awakened the jealousy or excited the avarice of neighbouring potentates, it was attacked in succession by the Egyptians, Assyrians, and Babylonians. The last were headed by Nebuchadnezzar, who, B.C. 588, having made himself master of the city, destroyed it, burned down the temple, after rifling it of its treasures, and carried off those of the inhabitants whom the sword had spared as captives to Babylon. After seventy years of captivity, Cyrus permitted the Jews to return; and the temple, though on a scale of much less magnificence than before, was rebuilt, B.C. 515. Jerusalem now enjoyed a period of repose, and had regained a considerable degree of prosperity, when, on the dissolution of the Macedonian empire, which Alexander had established, it was seized and sacked by Ptolemy Soter, who carried off a great number of the inhabitants to Alexandria. By the victorious achievements of the Maccabees, the Macedonian yoke was thrown off, and Jerusalem, in common with Judea, became once more independent, 165 B.C. It next

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became tributary to Rome; but, continuing to be governed by its own sovereigns, had not ceased to exist as the capital of a kingdom when the Saviour appeared. About forty years after his death the tyranny of the Romans drove a section of the Jews into revolt, and in A.D. 66 Jerusalem was taken by the insurgents. Titus, the son of the emperor Vespasian, regained it in the year 70, after one of the most terrible sieges recorded in history; the temple was burned, and the city razed to the ground. In 131 Hadrian ordered the city to be rebuilt. The Jews, apprehending that pagan idols would be set up in the holy places, broke into rebellion, and took Jerusalem, which the Romans recaptured only after a protracted and sanguinary contest. They then finished the building of the city, and calling it Ælia Capitolina, made it a Roman colony, and forbade the Jews to approach it on pain of death. It continued thus depressed till the beginning of the fourth century, when, Rome having become Christian, Jerusalem shared in the benefit, and assumed the appearance of a distinguished Christian city, under the fostering care of Helena, mother of Constantine the Great. This period of prosperity, prolonged by a succession of Christian emperors, was suddenly terminated in 636, by the conquest of the Mohammedans, under the Arabian Caliph Omar, whose dynasty was afterwards succeeded by that of the Turks. The indignities and cruelties heaped upon the Christians, and the utter desecration of their most holy places, roused the indignation of Europe, and led to the Crusades. In 1099 the Crusaders took Jerusalem by storm, and made it the capital of a Christian monarchy, which with difficulty maintained its existence till 1187, when it was finally overthrown by the celebrated Sultan Saladin. Since then Jerusalem has continued to be trodden under foot of the Gentiles, and now has no higher honour than that of giving its name to a sanjak in a Turkish pashalic. The population of the city has been recently estimated at 28,000, of whom about 7000 are Mohammedans, 10,000 Jews, and the rest Christians of various denominations. The population of the ancient city at the time of its greatest prosperity has been variously estimated. The assertions of Josephus that 3,000,000 would be collected in it at the passover, and that 1,000,000 perished during the siege of Titus, are manifestly absurd. The computation of Tacitus is 600,000, a figure which is also far beyond the limits of probability. Taking the area of the city at 2,250,000 yards, and allowing 50 to each inhabitant, the result is 45,000, an extreme estimate for a city containing palaces and public buildings; 30,000 may be set down as the likeliest estimate.

JERUSALEM ARTICHOKE. See ARTICHOKE.

JERVIS, SIR JOHN. See VINCENT (EARL OF ST.)

JESO. See YESSO.

JESSAMINE. See JASMINE.

JESSULMEER, or JASALMIR, a state of India, the most western in Rajputana, situated between lat. 26° 8′ and 28° 28′ N.; lon. 70° 3′ and 72° 51′ E., and bounded N. by Bhawalpur, N.E. Bikanir, S.E. and S. Jodhpur, and W. Sind; area, 16,000 square miles. It forms a large expanse of sandy desert, flat upon the whole, but varied, particularly in the south, by ridges of hills, insulated rocks, and occasional oases, producing pasture in sufficient abundance to feed large herds of cattle. There are no perennial streams. Pure drinking water lies so far below the surface that the wells have to be sunk in some places 300 feet. For most domestic purposes tanks, formed where the soil is free from saline ingredients, and filled during the rains, suffice; but when these fail, as they sometimes do, numbers both of human beings and of cattle perish from thirst. The climate is extreme, and the range of the thermometer is very great, varying in the north, in the course of one month, from 32° to 106°. The natural vegetation consists of a few broomy shrubs, which sometimes overspread the ground so as to form a kind of jungle, and of some stunted trees. The principal domestic animals are dromedaries, horses, cows, and sheep. The only manufactures of any importance are coarse and fine woollens. The trade is chiefly transit between Marwar and West Hindustan on the one side, and Sind and Afghanistan on the other. Population in 1881, 108,143.

JESSULMEER, or JASALMIR, capital of the above state, stands at the base of the south extremity of a rocky ridge, and is surrounded by ramparts of uncemented stone, flanked by bastions similarly constructed, but of greater height. In the south part of the town is the citadel, seated on an isolated eminence, scarped all round, and furnished with ramparts; but though formidable in appearance, it is of little strength, as an adjoining ridge completely commands it. Within the citadel the principal buildings are the palace, a vast pile surmounted by a huge umbrella, which is said to indicate the ruler's high Rajput descent; and six temples, three Brahmanical and three Jaina. The latter are ancient stone structures, elaborately carved and surmounted by lofty gilt spires. Many of the houses are solidly built of stone, and two stories high. Pop. 35,000.

JESTER, or COURT-FOOL. From very remote times there has existed a class of persons whose occupation it was to while away the time of the noble and wealthy, particularly at table, by all sorts of jests and merry conceits. Alexander the Great, Dionysius of Syracuse, Augustus and his successors, maintained such jesters. In the middle ages every court, secular or ecclesiastical, had its fool, as a necessary appendage; and there are some instances of court-jesters in the eighteenth century. Douce, in his Illustrations of Shakspeare, has a dissertation on the fools and clowns. He states that Muckle John was the last person who regularly held the office of court-jester in England, his predecessor, Archy Armstrong, having been sentenced to have his coat pulled over his head, and to be dismissed the king's service, for a sarcasm on Laud (1637). Since the time of the Commonwealth the post of king's fool has been discontinued, though some private persons had fools late in the last century. Swift wrote an epitaph on Dicky Pearce, the Earl of Suffolk's fool (1728). Mr. Douce states that the costume of the domestic fool, in the time of Shakspeare, was of two sorts. The one was a motley or parti-coloured coat, attached to the body by a girdle, and often having bells on the skirts and elbows. The breeches and hose were in one, and sometimes the legs were of different colours. A hood resembling a monk's cowl covered the head completely, and the breast and shoulders partly. It sometimes bore asses' ears, sometimes the neck and head of a cock, and sometimes only the comb of that bird (whence *coxcomb*, as a term of contempt). The bauble (*marotte*) was a short stick, terminated with a fool's head, or with that of a doll or puppet. To this was frequently appended a blown bladder, sometimes filled with sand or peas, and employed as a weapon of sportive offence; sometimes a skin or bladder only, and sometimes a club instead of a bauble, and occasionally both together. The other dress, which seems to have been most common in the time of Shakspeare, was a long petticoat, of various colours, fringed with yellow. There were, however, many variations from this dress; bells supplied the place of the cock's-comb; the head was shaven like a monk's crown; fox-tails or squirrel-tails were fastened on the clothes, &c.

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JESUITS, or SOCIETY OF JESUS, a religious order, which rose in influence and power far above all the other orders, and which, in the art of ruling, excelled the governments of the world no less than its ecclesiastical rivals. No other religious order affords a parallel to this; for, while those who give themselves only to devotion and religious contemplation present few distinguishing traits, and for the most part differ from one another only in their names, in the fashion and colour of their dress, the greater or less strictness of their rules, the number of their penances and devotional exercises; and while those of the more active class, who operate abroad by their influence at courts and in families, and by engaging in offices of instruction, pastoral care or charity, are almost universally but monks, the Society of Jesus early raised itself to a degree of historical importance unparalleled in its kind. But a small part of this greatness is to be ascribed to their founder, Ignatius Loyola, who owes his fame more to the shrewd policy and energy of his successors than to the merit of the original scheme of the order. At the University of Paris Loyola entered into an agreement with some of his fellow-students to undertake the conversion of unbelievers, and a pilgrimage to Jerusalem. Pierre Le Fèvre (a Savoyard), François Xavier (a native of Navarre), Jacopo Lainez and Nicolas Bobadilla (two Spaniards of ardent and powerful minds), and Rodriguez (a Portuguese nobleman) were the first companions of Loyola. A war with the Turks prevented their journey to Jerusalem. They therefore went to different universities in Upper Italy, to gain new associates; Loyola himself went with Le Fèvre and Lainez to Rome, where he accomplished, in 1539, his plan of founding a new and peculiarly organized order. He called it the *Society of Jesus*, in consequence of a vision, and bound the members, in addition to the usual vows of poverty, chastity, and implicit obedience to their superiors, to a fourth, viz. to go, unhesitatingly, whithersoever the pope should send them, as missionaries for the conversion of infidels and heretics, or for the service of the church in any other way, and to devote all their powers and means to the accomplishment of the work. The novices, besides spiritual exercises, were to be proved by performing the most menial offices for the sick, Xavier having given the example by sucking the loathsome sores of the sick in the hospitals. A special bull of Paul III., in 1540, established this society, whose object appeared so favourable to the interests of the Papal power; and in the following year the members, assembled in Rome, chose their founder for their first general. He showed himself, however, unequal to the management of great affairs. As general, he was ever pursuing secondary objects, while his learned and more sagacious friends, especially Lainez, who was his constant companion, contrived to improve and carry out his rude plans for the advancement of the society. The Popes Paul III. and Julius III. seeing what a support they would have in the Jesuits against the Reformation, which was rapidly gaining ground, granted to them privileges such as no body of men, in church or state, had ever before obtained. They were permitted not only to enjoy all the rights of the mendicant and secular orders, and to be exempt from all episcopal and civil jurisdiction and taxes, so that they acknowledged no authority but that of the pope and the superiors of their order, and were permitted to exercise every priestly function, parochial rights notwithstanding, among all classes of men, even during an interdict,—but also (what is not even permitted to the archbishops unconditionally) they could absolve from all sins and ecclesiastical penalties, change the objects of the vows of the laity, acquire churches and estates without further Papal sanction, erect houses for the order, and might, according to circumstances, dispense themselves from the observance of canonical hours of fasts and prohibition of meats, and even from the use of the breviary. Besides this, their general was invested with unlimited power over the members; could send them on missions of every kind, even amongst excommunicated heretics; could appoint them professors of theology at his discretion, wherever he chose, and confer academical dignities, which were to be reckoned equal to those given by universities. These privileges, which secured to the Jesuits a spiritual power almost equal to that of the pope himself, together with a greater immunity, in point of religious observance, than the laity possessed, were granted them to aid their missionary labours, so that they might accommodate themselves to any profession or mode of life, among heretics and infidels, and be able, wherever they found admission, to organize Catholic churches without a further authority. But the latitude in which they understood their rights and immunities gave occasion to fear an unlimited extension and exercise of them, dangerous to all existing authority, civil and ecclesiastical, as the constitution of the order, and its erection into an independent monarchy in the bosom of other governments, assumed a more fixed character. A general dispersion of the members throughout society, with the most entire union and subordination, formed the basis of their constitution. The Society of Jesus was accordingly divided into several ranks or classes. The novices—who were chosen from the most talented and well educated youths and men, without regard to birth and external circumstances, and were tried for two years in separate noviciate-houses, in all imaginable exercises of self-denial and obedience, to determine whether they would be useful to the purposes of the order—were not ranked among the actual members, the lowest of whom are the *secular coadjutors*, who take no monastic vows, and may therefore be dismissed. They serve the order partly as subalterns, partly as confederates, and may be regarded as the people of the Jesuit state. Distinguished laymen, public officers, and other influential personages (for example, Louis XIV. in his old age), were sometimes honoured with admission into this class, to promote the interests of the order. Higher in rank stand the *scholars* and *spiritual coadjutors*, who are instructed in the higher branches of learning, take upon them solemn monastic vows, and are bound to devote themselves particularly to the education of youth. These are employed as professors in academies, as preachers in cities and at courts, as rectors and professors in colleges, as tutors and spiritual guides in families which they wish to gain or to watch, and as assistants in the missions. Finally, the nobility, or highest class, is made up of the *professed*, amongst whom are admitted only the most experienced members, whose address, energy, and fidelity to the order have been eminently tried and proved. They make profession, that is, take the vows of their order, by binding themselves, in addition to the common monastic vows, by a fourth vow, to the undertaking of missions; and when they are not living together in pious ease in their professed houses, they serve as missionaries among heathens and heretics, as governors of colonies in remote parts of the world, as father-confessors of princes, and as residents of the order in places where it has no college. They are entirely exempt, on the other hand, from the care of the education of youth. None but the professed have a voice in the election of a general, who must himself be of their number, and who has the right of choosing from them the assistants, provincials,

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superiors, and rectors. The general holds his office for life, and has his residence in Rome, where he is attended by a monitor and five assistants or counsellors. He is the centre of the government of the whole order, and receives monthly reports from the provincials, and one every quarter from the superiors of the professed-houses, from the rectors of the colleges (which are the monasteries of the order, but with nothing very monastic about them), and from the masters of the novitiates. These reports detail all remarkable occurrences, political events, and the characters, capacities, and services of individual members, and thereupon the general directs what is to be done, and how to make use of tried and approved members. All are bound to obey him implicitly, and there is no appeal from his orders. He may even alter particular rules of the society, expel members without trial, or exile them, and inflict or remit punishments at his pleasure. Ignatius Loyola, who died July 31, 1556, at Rome, left to the order the sketch of this constitution, and a mystical treatise called Exercitia Spiritualia (Spiritual Exercises), the use of which was formally introduced among the Jesuits, and occupies the first four weeks of every novice. This enthusiast obtained a lasting fame, and the honour of canonization (1622), by the rapid increase of his order, which, as early as 1556, numbered 1000 members in twelve provinces. The first was Portugal, where Xavier and Rodriguez, at the invitation of King John III., had founded colleges. The increase of the Jesuits was no less rapid in the Italian states, where they were supported by the influence of the pope; in Spain, where they were at first opposed by the bishops, but soon prevailed through the example of the nobility, especially of one of the most powerful grandees, Francis Borgia, duke of Candia; and in Catholic Germany, where Austria and Bavaria granted them privileges and foundations. At the universities of Vienna, Prague, and Ingolstadt they obtained an ascendency which they held for two centuries. In their strict hierarchical principles, in their restless, zealous activity, and in their success in making converts, the Catholic princes, as well as the pope himself, found the most effectual barrier against the growing power of Protestantism. Even to the common people they soon recommended themselves as the offspring of the new spirit of the times, and were, therefore, readily favoured by persons who were ill-disposed to the monks. For institutions which would not adopt the tendency of the age towards practical improvement and a more cheerful tone of conduct could no longer succeed, after the restoration of learning and sound reasoning; the excited world preferred business to contemplation, and the mendicant monks, who had everywhere pushed themselves into notice, had passed their most splendid epoch. Those who disliked the Franciscans as too coarse and vulgar, and the Dominicans as too rigid and gloomy, were pleased with the polished, cheerful, and social Jesuits. Nobody could accuse them of idle brooding in prayer and psalm-singing; even in the houses of the professed, the canonical hours were not observed; they nowhere remained long at their exercises of devotion, even as the spiritual guides of the laity; they carefully avoided all appearance of spiritual pride, and dressed like the secular clergy, and might even change this dress for the ordinary garb of the country, in places where they thought to gain easier entrance without any such mark of distinction. Besides this, they were directed to use a gentle demeanour while engaged in their religious or political operations; to win men by compliance with their peculiarities; never to contend openly, even against declared enemies; and never to betray any passion; but to keep their views and measures secret, and, under a show of coldness and reserve, to prosecute the more ardently and constantly in secret what might have excited opposition if made public. This spirit of worldly policy and accommodation to circumstances was principally derived from the principles of their second general, Lainez, who had the address to soften what was austere and monastic in the regulations of the founder, and to adapt them, according to the circumstances of the times, to the object of the society. This was originally nothing else but the preservation and establishment of the Papal power against all the attacks of Protestantism, of kings, and national bishops. To this end the Jesuits systematically laboured, under the pretext of promoting the greater glory of God (*Ad majorem Dei gloriam*, as the inscription is on their arms); and as nothing appeared more conducive to their purpose than the subjection of the mind and of public opinion, they gained dominion over the young by the establishment of schools, and over the adult by confession, preaching, and the common intercourse of society. When Lainez died in 1565 this system, and the active, energetic spirit belonging to it, had already become decidedly fixed in the internal character of the order, so that the example of monastic devotion held up by his successor, Francis Borgia, who was afterwards canonized, and the efforts of Popes Paul IV. and Pius V. to restore the observation of the canonical hours, proved ineffectual. The succeeding popes and generals allowed the order perfect freedom from all monastic constraint, and the wisdom of its system soon appeared evident in the important successes and services which it accomplished. Their foreign missions, begun by Francis Xavier in the Portuguese East Indies in 1541, were attended with vast and unprecedented success, if their own accounts may be trusted. He converted, with the aid of his fellow missionaries who were sent to assist him, some hundred thousands to Christianity in Goa, Travancore, Cochin, Malacca, Ceylon, and even in Japan, and died (1552) on his way to China, with the fame of a true martyr for religion, which gained for him the name of the *Apostle of India*, and the honour of canonization. His triumphs over heathenism were seconded by the cruelties of the Inquisition at Goa, while other Jesuits went to South America, and laboured successfully in the civilization and subjugation of the natives in Brazil, and in the neighbouring country of Paraguay. Africa alone resisted their efforts; on the western coasts they never gained a settlement, and from the east they were driven by the Copts; while the Abyssinians, whom they had governed for a long time with the aid of Portugal, rose against them, and put them to death. But in Europe their influence rapidly increased. Their efforts were chiefly instrumental in removing the impressions, so dangerous to the Catholic Church, which the Reformation had left even in Catholic countries. They carried out upon a grand scale, and for the higher classes, the improvements in the system of instruction which had been already begun by the Barnabites, the fathers of the Christian doctrine, those of Somasquo and of the oratory, and, finally, by the Piarists, for the humbler classes of the community. Claudius Aquaviva, of the family of the dukes of Atri, general of the Jesuits from 1581 to 1615, was the author of their system of education, and his work, Ratio et Institutio Studiorum Societatis Jesu, is the platform of the far-famed schools of the Jesuits. These were partly boarding-schools for boys of all classes, and partly seminaries for those youths who were intended for the order, in which they stayed till their entrance upon their novitiate. The scholars (so called) and coadjutors, living together in the colleges, gave instruc-

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tion by methods well suited to the wants of the young, and accompanied with surprising success, so as to be considered as worthy of imitation even in the eighteenth century. A free, affable, and affectionate manner towards the pupils, united with unceasing vigilance and a wise solicitude for the preservation of their innocence and virtue, distinguished these above all other monastic schools. To excite emulation, and to animate industry, they had public exercises in speaking, and distributed prizes and titles of distinction. To strengthen and develop the body gymnastic exercises were introduced, and even the outward demeanour and address were polished by theatrical representations. The want of deep critical learning, and the arbitrary mutilation of the old classics for the use of the young, exposed the Jesuit teachers to the censure of the philologists. Nevertheless, the schools had an uncommon success, as the best of that time. A single college frequently had several hundred scholars; the young nobility were almost exclusively sent to them, and even from Protestant countries, so that the Protestants found it necessary to establish lyceums and academies for the gentry, of a character suited to the higher demands of the age. The Jesuits derived the greatest advantage from these institutions, by being enabled to choose the brightest geniuses at an early age, and mould them to their purposes. This explains how the Society of Jesus was able to render important services to the cause of literature and science. Such Jesuits as Serrarius, Petavius, Sirmond, Tursellinus, Bellarmin, Balde, Mariana, and Flechier greatly advanced the sciences of history and geography, the study of language and rhetoric. Scheiner and Boscovich were eminent in mathematics and astronomy. No men understood better than the Jesuits the art of showing off to the best advantage their really valuable services; the world could not but acknowledge them to be improvers and benefactors of their age. Accordingly their houses and possessions visibly increased, their churches and confessionals were not empty; they contrived, too, with much address, to obtain legacies and presents, and to seize upon every advantage which pious credulity and the extent of their connections presented them. They would not allow their internal constitution to be inquired into or imitated; and when in 1623 a number of enterprising females in Italy and on the Lower Rhine formed a plan of uniting into an order under the name of the Jesuitines, to be modelled after the Society of Jesus, they repulsed all the advances of their would-be sisters, and in 1631 procured a Papal decree for the abolition of the new order. But in England and the Protestant states of the north they were not so successful, their repeated attempts to establish themselves there proving fruitless. In 1618, however, the number of members amounted to 13,112 in thirty-two provinces, without including those in France, the Rhenish provinces, and the Netherlands, Poland, and Lithuania, Spanish America, the Philippines, and China. Elated with this success, they celebrated in 1640, under General Vitelleschi, the centennial anniversary of their order with great pomp. There were some circumstances, however, to damp their exultation; for notwithstanding the great favour which they enjoyed at court and among the people, the non-Jesuit clergy and the learned men of the age soon began to dread the powerful influence which the society was rapidly acquiring throughout Christendom. The universities, bishops, and clergymen found their interest opposed to that of the Jesuits, whose privileges, where they were carried into effect, would be necessarily injurious and oppressive to the body of teachers and the clergy. The ancient orders of monks, whose hatred they had excited by their encroachments on their province as much as by their good fortune, found subject enough for complaint and bitter accusations in the duplicity and worldliness of the conduct of some of their members. They made no scruple of invading what had been regarded as the appropriate province of other orders, and were on the best terms with the Carthusians, who, on account of their vow of silence, were the only ecclesiastics out of their own body to whom the Jesuits were permitted to make confession. Their busy intriguing spirit made them the objects of suspicion and jealousy to statesmen and jurists, on account of their interference in political affairs, the mischievous effects of which were already manifest in Portugal under the reigns of John III. and Sebastian, their pupils, and after the death of the latter were a principal cause of the surrender of this kingdom to the Spanish crown. For this reason the parliament and higher clergy of France for twenty years resolutely resisted the attempts of the Jesuits to gain a footing in that country. The University of Paris also declared the whole order to be useless, and its existence incompatible with the rights of the Gallican Church. It was owing chiefly to the favour of the Guises that they at last, in 1562, were admitted into France under the name of *Fathers of the College of Clermont*, with a humiliating renunciation of their most important privileges. Notwithstanding this depressed condition they soon contrived to establish themselves in Paris and the southern and western provinces, and during the civil commotions to deprive the French Protestants of their rights, gradually to establish their privileges, and to maintain their footing in spite of the suspicions entertained of their having had a share in the murder of Henry III. They were banished, indeed, in 1594, on account of the attempt upon Henry's life by their pupil Chatel; yet they still remained undisturbed in Toulon and Bordeaux, and at the intercession of the pope were again received by Henry IV. in 1603. They soon, in their office of court-confessors, carried on the same intrigues as before. Their participation in the crime of Ravaillac could not be proved against them; they themselves joined in condemning the book in which the Spanish Jesuit Mariana defends the king's assassination, and, by cunning and obsequiousness towards the court, preserved themselves undisturbed. They made themselves still more important to the German Empire when they became the confidential advisers of Ferdinand II. and III. They discovered remarkable political talent in the Thirty Years' war; the league of the Catholics could do nothing without them. But while they were thus successful as statesmen in this part of Europe (though they failed in preventing the triumph of toleration at the Peace of Westphalia), a new storm burst upon them in France and the Netherlands from the Jansenist controversy. The ancient hostility of the University of Paris, which had always been strongly averse to the admission of the Jesuits as teachers, rose up, in union with the rigid morality of the Jansenists, against the notorious semi-Pelagianism of Molina and his brother Jesuits. The character of the Jesuits received a fatal wound from the pen of Pascal, whose famous Provincial Letters exposed the mischievous doctrines and practices of the Jesuits with admirable wit and argument, to which they opposed little but abuse and violence. These letters, which have been published in numerous editions since 1656, were read through all Europe, and their testimony quoted in the sentence of condemnation pronounced by Innocent IX. in 1679 against sixty-five offensive propositions, mostly of Jesuit casuists. It availed them little that royal decrees and Papal bulls, procured by the Jesuit confessors of Louis

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XIV. (La Chaise and Le Tellier), were levelled against Jansenism, and its ruin completed by the well-known bull Unigenitus. In the minds of reflecting and well-disposed persons they still remained suspected of an attachment to the principles of their most eminent casuists, attacked by Pascal —principles which afforded the most startling solution of their crafty and ambiguous conduct. A lax morality, accommodated to the inclinations of a licentious age, which made interest and external circumstances the rule of conduct, and consecrated the worst means for a good end; their probabilism—a system of principles and rules of life which tolerated everything that could be defended as probably admissible; their excuses for perjury and crimes of all kinds, sometimes by arbitrary perversion of language, sometimes by ambiguous expressions and perplexing interpretations; sometimes, too, by mental reservations, according to which a man had only to think differently from what he said and did to be justified in his own sight from the greatest crimes,—these and other traits of a like nature may be more fully and accurately learned from the letters of Pascal or the writings of the Jesuits Sanchez, Bauny, Escobar, Suarez, and Busembaum. Their own defences against these charges only confirmed the suspicion excited against their system of morals, while they palliated and conceded a part where the whole was culpable. Other accusations were now brought against them which they were still less able to repel. Their superficial mode of instruction and the theatrical disorders of their schools had been already condemned by Mariana, a learned Spanish Jesuit; the gross selfishness of the order had been publicly exposed in Sciotti's Monarchia Solipsorum; the indifference with which they permitted their heathen converts to continue their old worship of idols, on condition of their mentally adoring at the same time Christ and the Virgin Mary; and their want of agreement with the other missionaries in China, had been warmly but ineffectually censured by several Papal bulls. Their conduct, too, was now and then discovered to harmonize too well with their indulgent code of ethics, and it was for this reason that the Iroquois who had been converted by them expressly stipulated in a treaty of peace (1682) for the removal of these licentious brethren, who did everything that Jesus did not do. It was now becoming every day more evident to the world that the Jesuits were not aiming to promote virtue and religion, but their own interests. This was confirmed by the complaints of merchants at the extensive traffic of the Society of Jesus in the products of their foreign missionary stations. It cannot be denied that the republic of natives, formed by them under the authority of Spain, in Paraguay and Uruguay, in which they ruled with absolute power, and which in 1753 contained nearly 100,000 subjects, was conducted by them with consummate policy and skill, and was perhaps the best means for civilizing those savages; but that they made it also a trafficking establishment for the emolument of the order was shown on occasion of a treaty of commerce, by which Spain in 1750 gave up seven districts of this country to Portugal. The resistance which the natives made to the Portuguese, with an army of 14,000 men commanded by Jesuits, finally obliged the contracting powers to annul the treaty. The Portuguese Jesuits, though they disclaimed all concern in this affair, underwent a prosecution, which was not terminated when an attempt upon the life of the King of Portugal hastened their downfall. The minister Pombal made out their agency in this attempt to some degree of probability, and finally succeeded in 1759 in expelling them from Portugal, and confiscating their possessions by an edict in which the king declared them guilty of high treason. Before this first blow the order consisted of 24 professed-houses, 669 colleges, 176 seminaries, 61 novitiate-houses, 335 residences, and 273 missions in heathen and Protestant countries, and 22,589 members of all ranks, half of whom were ordained priests. In France, where Choiseul and Pompadour were unfavourably disposed towards them, their ruin was occasioned by the trade which they continued to carry on in spite of all the pope's orders to the contrary. In 1743 they had established a trading-house at Martinique by their deputy Father La Valette, under pretence of a mission, which soon monopolized nearly the whole trade of that and the neighbouring islands, and had commercial connections with the principal merchants of France. It happened that two ships, with a cargo valued at 2,000,000 francs, sent over by La Valette to pay the house of Lioncy at Marseilles, fell into the hands of the British. The Jesuits refusing to make any indemnification for the loss, the above-mentioned house brought an action against them, which terminated in the sentencing of the former to make full reimbursement, and was the means also of bringing to light other abuses of the order. Lorenzo Ricci, their general, refusing to make any change in their constitution by the declaration '*Sint ut sunt, aut non sint*' (Let them be as they are, or not be), the king issued a decree in 1764 for abolishing the order in all the French states as a mere political society, dangerous to religion, whose object was self-aggrandizement. In vain did Clement XIII. in a bull issued at the same time recommend the Jesuits as the most pious and useful members of the church. They were also driven out of Spain in 1767, and soon after from Naples, Parma, and Malta by the efforts of Choiseul and the Spanish minister Aranda. The voice of public opinion at length compelled Pope Clement XIV. to publish his famous bull, Dominus ac Redemptor noster, of July 21, 1773, by which the Society of Jesus was totally abolished in all the states of Christendom. These measures were everywhere executed with a quick and strong hand, because a formal process would have given time for a formidable opposition. Yet their most important treasures and documents were already taken out of the way, as it is supposed, and their archives and coffers did not satisfy expectation. Ricci, who might have averted this fate by making some concessions towards a change in their constitution, protested the innocence of their order, which was bound to regard everything which came from him as necessarily right and obligatory; but, in fact, the great infringements on the natural rights of others, incompatible with every well-ordered church or state, which were in a manner legalized by their privileges, rendered the existence of such a body in a state a political solecism. Unquestionably the world had much reason to rejoice at their fall, although a great part of the members were entirely innocent; and their former services will always be gratefully remembered. The ex-Jesuits, however, suffered no further penalty than being obliged to quit their houses, lay aside the garb of the order, renounce all intercourse with one another, and either enter some of the other orders or put themselves under the superintendence of the bishops. They received annuities from the revenues of their confiscated estates except in Portugal. In this kingdom and in Spain the ex-Jesuits were also prohibited from residing in the country, while in the States of the Church, in Upper Italy, and in Germany, where they were treated with the most forbearance, in Hungary, Poland, and even in France they were suffered to remain as private persons. Frederick II.

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indeed would not join in the general expulsion of the order in order to gratify his Catholic subjects in Silesia, to retain a school-establishment which cost him nothing, and to keep a productive source of revenue. Nevertheless the Jesuits in the Prussian states were obliged to give up the garb of their order and to renounce their constitution. Under the name of the *priests of the royal school-institute* they were henceforth confined to the office of instructing youth; and even this institution was abolished by Frederick William II. Russia was now the only country that remained to them. Peter the Great had expelled them from his empire as early as 1719; but in 1772 several houses of their order fell, with the eastern part of Poland, under the dominion of Russia. Catharine spared them, even after the abolition of the order, out of regard to her Catholic subjects, and on account of the usefulness of their schools. The patronage of Czernitcheff and Potemkin enabled them to obtain permission to erect a novitiate-house in 1779, and in 1782 to choose a vicar-general. Meanwhile circumstances had taken a favourable turn for them in Rome. Clement XIV. died 1774, and his successor soon showed himself a friend of the society, which was yet very far from being extinct. The ex-Jesuits, who were deprived at once of their offices by the decrees of abolition, having been condemned unheard, still remained respectable clergymen, who had powerful friends in all classes, and were intrusted with important stations in the church and offices of instruction. In the year 1780 there were 9000 of them out of Italy who were thought to maintain a constant union under private directors or superiors; they were also thought to have possessed themselves of the secrets of the Rosicrucians and to have taken a part in the schemes of the Illuminati. They were charged, moreover, with a plot to destroy Protestantism. Undaunted by these assaults of an often unjust prejudice, the ex-Jesuits, firmly united to each other, were hoping in the meanwhile for the restoration of their order, on which, according to their belief, the welfare of mankind depends. An attempt in 1787 to revive their order under the name of *Vicentines* was unsuccessful. The *Fathers of the Faith*, an ecclesiastical order founded by Paccanari, a Tyrolese enthusiast, and formerly a soldier of the pope, under the patronage of the Archduchess Mariana, was composed mostly of Jesuits, and put in operation at Rome, by the aid of the easily persuaded pope, as a new form of the Society of Jesus, under altered regulations; but they were never recognized by the secret superiors of the ancient Jesuits as their brethren. The plans of the Jesuits were aided by Pius VII. He established their order in White Russia and Lithuania, where it continued in operation, but confined to offices of teaching and priestly duties under the vicar-general, Daniel Gruber, and silently restored them in 1804 in the Island of Sicily, which was entirely separated from Europe by the fate of the Continent. Hence it excited no surprise among observing men that this pope, who in 1806 had canonized a Jesuit, should make use of the first opportunity to revive the order. The bull issued to this effect (Solicitudo omnium Ecclesiarum, August 7, 1814) speaks of urgent entreaties and a general desire of the Christian princes and bishops for the restoration of the society, which restoration is called a *repristination*, thereby intimating that it would again appear in precisely the same form in which it had fallen. Accordingly the novitiate at Rome was solemnly opened, November 11, 1814, and numerous members, often eminent for rank and attainments, have since been admitted. In 1824 they regained possession of the *Collegium Romanum* in that city. In 1815 a college was given them at Modena, and they did not delay to accept the invitations of the Kings of Sardinia, Naples, and Spain. Ferdinand VII. (May 29, 1815) reinstated them in the possession of all the privileges and property which had been taken from them in 1767. He subsequently appointed St. Ignatius captain-general of the Spanish army, and conferred on him the grand cross of the order of Charles III. The Helvetic canton of Fribourg also (September 15, 1818) restored the old Jesuit college formerly established there for the instruction of youth, but they were finally expelled from the Swiss territory in 1847. The Spanish revolution of March, 1820, was followed by their banishment from the kingdom; but they were restored upon the re-establishment of absolute power in 1823, though only to be again expelled in 1835. They have succeeded in once more gaining a considerable footing in that country. Portugal alone steadfastly adhered to its ordinance of September 3, 1759, which banished the Jesuits out of the kingdom. In France the Ultra-Royalists succeeded in causing their presence to be connived at, and they had congregations and seminaries at Montrouge, St. Acheul, &c., previous to the revolution of 1830. In Russia, where they had been expelled by Peter the Great, and readmitted by Catharine II., it appeared that they were using their endeavours to win over the sons and daughters of distinguished families to the Catholic Church, and they were banished in consequence by an ukase of January 1, 1817, from Moscow and St. Petersburg; and, as they still carried on their proselyting schemes, and made themselves obnoxious to the government by intrigues of all sorts, an imperial ukase of March 25, 1820, abolished their order for ever in Russia and Poland, and provided that the whole body of its members should be transported beyond the boundaries of these two countries at the expense of the government, regard being had to the age and bodily condition of individuals; and that the estates of the order should be confiscated. After their banishment from Russia some of them were allowed to take refuge in Austria, but were commanded in 1825, on pain of exile, to acknowledge the archbishop of the province as their supreme head. There they now possess several colleges, and the theological faculty of the university of Innspruck is in their hands. In England the tolerating spirit of the British constitution has permitted them to open educational establishments, the principal of which are the college at Stonyhurst, near Preston, in Lancashire; Mount St. Mary's College, near Chesterfield, Derbyshire; and St. Benno's, at St. Asaph, in North Wales. In Ireland they have also several important institutions, and, within a recent period, in Scotland. They have also colleges in the United States. It was under the influence of this order that the Œcumenical Council of 1870 was held, when the dogma of the Infallibility of the Pope was declared an article of faith, and the Immaculate Conception finally placed on a like footing. By the law of the 4th of July, 1872, they were expelled from the German Empire, to the erection of which they had shown the utmost hostility. In the same year the order was suppressed in Guatemala, Nicaragua, and San Salvador. In 1880 they were expelled from their conventual establishments in France, and a considerable number of them came to Britain.

JESUS, son of Sirach, the author of the apocryphal book called Ecclesiasticus, or in the Septuagint, The Wisdom of Jesus the son of Sirach. The time when he flourished is not known. The book was originally written in Aramaic, but is now extant only in the Greek translation made by his grandson. The translation is supposed to have been made in

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the second century before Christ. The best edition is that of Bretschneider (Regensburg, 1806), in Greek and Latin, with notes. The book is founded on the Old Testament, particularly the Proverbs, but contains the author's own appreciation of the subjects he treats. The Roman Catholic Church has held the book of Ecclesiasticus as canonical since the Council of Carthage.

JESUS CHRIST (*Jesous*, the Greek form of Joshua or Jeshua, contracted from Jehoshua, meaning, help of Jehovah, or saviour; *Christos*, anointed), the Son of God, the Saviour of men, whose birth, life, and death were predicted by prophets, and attended with miraculous manifestations of divine power, was born of the Virgin Mary, of the tribe of Judah, who was betrothed to Joseph, by occupation a carpenter, the descendant and heir of the house of David. Two genealogies of Joseph are given—one by Matthew, chap. i.; the other by Luke, chap. iv. The former is supposed to contain the list of heirs of the house of David, whether by direct or indirect descent; the other the direct ancestors of Joseph. Thus Jacob (Matt. i. 16) had no son, but a daughter, Mary; while his brother Heli had a son, Joseph, who married his cousin Mary, the heiress of his uncle Jacob and the mother of Jesus. It was foretold that Christ should be of the seed of Abraham and the son of David. The place of his birth was Bethlehem; the time, according to the received chronology, was in the year of Rome 754. Scholars are now almost unanimously agreed that this date is too late, and it is generally placed about four years earlier, but the exact period is unascertained. Our information concerning him is derived almost entirely from the accounts of his life written by the four evangelists Matthew, Mark, Luke, and John, and incidental notices in other parts of the New Testament. The coming of a forerunner to the Saviour, John the Baptist, in the spirit and power of Elias, was foretold by an angel (Luke i. 17). The angel Gabriel announced to Mary that the power of the Highest should overshadow her, and that she should bear a son who should rule over the house of Jacob for ever; and on the night of his birth an angel appeared to some shepherds, and announced the coming of a Saviour. On the eighth day he was circumcised according to the law of Moses, and on the fortieth was presented in the temple, where the aged Simeon pronounced him to be the light of nations and the glory of Israel. The coming of the divine infant was also hailed by the adoration of the Magi or wise men of the East, who were miraculously directed to the house where the young child was. Herod, alarmed by these indications, determined to destroy all the male children of Bethlehem and its vicinity of the age of less than two years, for the purpose of effecting the death of Jesus. But Joseph, being miraculously warned of the danger, fled to Egypt with the virgin and her child, and on his return, after the death of Herod, went to reside at Nazareth in Galilee, whence Jesus is called a Nazarene. We have no further accounts of the earlier years of Jesus except the remarkable scene in the temple when he was twelve years old, and the general observation of Luke, that he remained in Nazareth with his parents and served them. At the age of about thirty (Luke iii. 23) he was baptized by John in the river Jordan, the Spirit of God descending upon him like a dove, and a voice from heaven proclaiming, 'Thou art my beloved Son; in thee I am well pleased.' Previously, however, to entering upon his office of divine teacher he retired to a solitary place, where he passed forty days in fasting, meditation, and prayer, previous to the remarkable scene of the temptation described by the evangelists—Matthew, chap. iv.; Mark i. 12–13; Luke, chap. iv. He was afterwards transfigured in the presence of three of his disciples, when Moses and Elias appeared to him from heaven, and his raiment became white and shining, and his face shone as the sun. On this occasion again a voice came from heaven, saying, 'This is my beloved Son; hear ye him' (Matthew, chap. xvii.; Mark, chap. ix.; Luke, chap. ix., verses 28–36). His mission is generally considered to have occupied three years, spent in acts of mercy (chiefly miraculous), in inculcating a purer system of morals, more exalted notions of God, and more elevating views of man and his destiny than had yet been presented to the world. A great part of his teaching was in parables, which he frequently explained to his disciples. It has been observed by some critics that he had adopted the parabolic form of instruction after the Jews had shown a decided distaste for his teaching. His doctrine is embodied chiefly in the sermon on the mount (Matt. chap. v.–vii., and Luke, chap. vi.), containing the form of prayer he taught to his disciples, commonly called the Lord's Prayer; in his discourses to the Jews in John, chap. v.–viii. and x.; to his disciples, chap. xiv.–xvi.; and in his intercessory prayer, chap. xvii. His divine mission is evidenced not only by his miracles and the supernatural breadth and power of his teaching, but by the purity of his life, his devotion to the will of his heavenly Father, and his unwearied labours and sufferings for the good of men. He was equally unsparing in his denunciation of sin, and free in offering forgiveness to repentant sinners. He chose twelve apostles to be the companions of his ministry, the witnesses of his miracles, and the depositories of his doctrine; and he was betrayed into the power of his enemies by one of these with the mockery of a friendly salutation. Betrayed by one, denied by another, and abandoned by all, he was carried before the Jewish priests, found guilty, and by them delivered over to the Roman magistrates, who alone had the power of life and death. Condemned to death as a disturber of the public peace, he was nailed to the cross on Mount Calvary, and it was in the agonies of this bitter death that he prayed for the forgiveness of his executioners, and with a touching act of filial love commended his mother to his favourite disciple. The evangelists relate that from the hour of noon the sun was darkened, and three hours after Jesus, having cried out, 'It is finished!' gave up the ghost. The vail of the temple, they add, was torn asunder, the earth shook, rocks were rent, and the tombs opened. The centurion who was present directing the execution exclaimed, 'Truly this was the Son of God!' The body of Jesus was taken down by Joseph of Arimathea, and placed in a tomb, about which the Jewish priests, remembering his prophecy that he should rise on the third day, set a guard, sealing up the door. Notwithstanding these precautions his prophecy was fulfilled by his resurrection on the first day of the week (Sunday), and he appeared repeatedly to his disciples to encourage, console, and instruct them. On the fortieth day after his resurrection, while with them on the Mount of Olives, after he had given them instructions to teach and proselytize all nations, promising them the gift of the Holy Spirit, a cloud received him out of their sight, and he was taken up to heaven. While the disciples stood gazing after him two men in white apparel appeared to them, and predicted his coming again in like manner as they had seen him go. See the closing chapters of the four evangelists, and Acts i. 1–14.

JESUS COLLEGE, Cambridge, was founded by Alcock, bishop of Ely, in 1496. It has sixteen foundation fellowships, open without restriction to

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all her majesty's subjects. Five were of the original foundation, and the others have been added by subsequent benefactors. Six of the fellows are required to be in orders. The mastership and one fellowship are in the absolute appointment of the Bishop of Ely. To the other fellowships on a vacancy the master and fellows nominate two candidates, one of whom is elected by the bishop. There are numerous scholarships.

JESUS COLLEGE, Oxford, was founded by Queen Elizabeth in 1571 on the petition of Dr. Hugh Price, treasurer of St. David's, who left lands for the maintenance of a principal, eight fellows, and eight scholars. It was increased by different benefactors until it came to consist of a principal, nineteen fellows, and eighteen scholars; but by the ordinance of the university commissioners the fellowships have been reduced to thirteen, a half of which as near as may be are to be filled up by natives of Wales, the other to be under no restriction by reason of birth. A fellowship founded by Charles I. for natives of Guernsey and Jersey has been converted into two scholarships for natives of these islands or persons educated at Elizabeth College, Guernsey, or Victoria College, Jersey. One of the suppressed fellowships is applied to the purposes of the professoriate; the others to raise the number of fellowships other than those of the original foundation to twenty-two, of which two are open, and twenty are filled by persons born in Wales or Monmouthshire, or educated at certain specified schools there. There are about thirty exhibitions of £40 each. This was the first college founded on Protestant principles. It has the presentation to about twenty livings.

JESUS SIRACH. See SIRACH.

JET, says Dr. Young, 'appears to be wood in a high state of bituminization.' And certainly jet often appears with traces of ligneous structure; at the same time there are specimens of bones which seemingly have been gradually impregnated with, and at last wholly replaced by, this substance. Among the jet-rock there is found a liquid hydrocarbon, somewhat resembling petroleum oil, which occurs in the cavities of ammonites, &c., and is also sometimes found in nodules, the presence of which is generally supposed to point to a rich vein of jet.

From these and other observations it would appear that jet existed as a liquid substance, and that this substance gradually permeated between the laminations of the shales, &c., covering over or in some cases entirely replacing any woody matter which it met with.

Jet occurs in compact masses so hard and solid as to be susceptible of being turned on a lathe and manufactured into ornamental articles. It has been worked for centuries in Whitby, Yorkshire. It is found in thin laminations, which subsequently thicken out to 2 or 3 inches in the upper lias strata in that neighbourhood; a lower bed, from which the best quality is obtained, has a thickness of 20 feet, and is known as jet rock. Jet is supposed to have been worked in England as far back as the time of the Romans. Jet rosaries and crosses were common in the Abbey of Whitby when it was a resort of pilgrims. The jet manufactures of Whitby fell away about the time of Queen Elizabeth, and were revived in 1800. It is also manufactured at Scarborough.

JETSAM. See FLOTSAM.

JEUX FLORAUX (floral games), a festival annually celebrated in Toulouse. As early as the times of the troubadours Toulouse had a literary institution called the Collége du gai Savoir. It was founded in 1323 by seven troubadours, who assembled, according to a usage probably already old, in a garden in the Faubourg des Augustines, Toulouse, to devise poetry. In 1323 they sent a letter in verse to all the poets of the Langue d'Oc, inviting them on the 3d of May, 1324, to a poetic festival, where the composer of the best poem was to receive a violet of fine gold. Arnauld Vidal of Castelnaudary won the prize by a poem in honour of the Virgin. The *capitouls* (magistrates) of the city, who had likewise been invited to encourage a festival so much to the honour of Toulouse, offered in future to furnish the golden violet. To increase the splendour of the annual celebration two other prizes were added to the violet—an eglantine and a pansy, both of silver. The society continued to prosper, and in 1355 laws were drawn up called the *Lois d'amour;* new prizes were instituted; Jews, Saracens, blasphemers, and excommunicated persons were excluded from competition. He who took one prize received the title of Bachelor; he who took three of Doctor of the Gay Science. In 1356, when the suburbs of Toulouse were destroyed to prepare for a siege by the English, the society was removed to the town. Similar institutions afterwards arose at Barcelona in the reign of King John, and at Tortosa in the reign of King Martin. The original institution at Toulouse declined during the troubled period of the fifteenth century, and had become nearly extinct, when it was revived during the epoch of the renaissance by Clemence Isaure. She made a considerable bequest to the society, in gratitude for which she received the name of foundress (which has misled some inquirers), and the society now took the name of Collége des Jeux Floraux; the titles of doctor and bachelor were superseded by that of *maître es jeux floraux.* The society, however, soon became corrupted with riches. Feasts and junkettings took the place of the original object, which was forgotten. It was reformed in 1694 by Louis XIV. on the petition of the academician Laboulère. The number of *maintainers* was raised from seven to thirty-six (afterwards increased by Louis XV. to forty); the society was recalled to its original object, and erected into an academy under the protection of the Chancellor of France. It was dispersed at the revolution, and revived in 1806. Its annual *fête* is still celebrated, and except during the period of its suspension it has since 1698 published an annual volume of competition pieces. As might be expected, its influence on literature is insignificant, and its annual competitions remarkable for their sterility. In 1867 there were 670 pieces sent in for competition. The first prize was awarded to a poem called Le Midi de la France, which describes the district by such indisputable geographical truths as—

> 'La Tarn tombe et se change en un torrent qui gronde,
> La Garonne est un lac sous le nom de Gironde,'

and celebrates its productiveness in the harmonious numbers—

> 'Le maïs turc ainsi que le riz de la Chine,
> Sans peine y prend racine.'

In 1874 the pieces of verse sent in were rather fewer, namely, 622.

JEW, THE WANDERING, a poetical personage of popular traditions, who owes his existence to a story connected with the well-known scene in the history of Christ's passion. As the Saviour was on the way to the place of execution, overcome with the weight of the cross, he wished to rest on a stone before the house of a Jew, whom the story calls Ahasuerus, who drove him away with curses. Jesus calmly replied, 'Thou shalt wander on the earth till I return.' The astonished Jew did not come to himself till the crowd had passed and the streets were empty. Driven by fear and remorse, he has since wandered,

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according to the command of the Lord, from place to place, and has never yet been able to find a grave. This punishment of unbelief and hardness of heart —a condemnation to wander for ever on the earth, and to be the contemporary of all centuries—has afforded materials for the poets and novelists. Shelley, Lewis, Croly, and Mrs. Norton in England, Schubart and Schlegel in Germany, and Sue in France, have turned this legend to account. Goethe (in the third volume of his own Life) has sketched Ahasuerus with great spirit and humour as a philosophic cobbler at Jerusalem who opposes the Saviour with a cold worldly logic which will not look above the things of earth, and is therefore condemned to remain in this world (which is all to him) until a desire for higher things should awaken in him.

JEWELL, JOHN, Bishop of Salisbury, an eminent English prelate, born at Berry Narber, Devonshire, in 1522, after receiving his first education in his native county, was entered at Merton College, Oxford, and soon distinguished himself by his application to study. He early embraced the principles of the Reformation, and as a college tutor inculcated them among his pupils, though not without considerable caution, as Henry VIII. was still alive, and his persecuting edicts were still in force. On the accession of Edward VI. Jewell publicly declared his faith, became intimately connected with Peter Martyr, and both by his exertions in the university, and by his sermons and writings, contributed greatly to the progress of Protestantism. On the accession of Mary, when Popery once more gained the ascendant, he at first temporized, and even endeavoured to screen himself from severe penalties by subscribing the popish doctrines which he had renounced. Even this, however, did not avail him, and hence, while on the one hand he was upbraided by his conscience, he was, on the other, attacked by his enemies, who alleged, and no doubt truly, that his subscription was insincere. Having with difficulty escaped from the emissaries of Bishop Bonner in 1554, he reached Frankfort, where he made the only reparation in his power, by making a public acknowledgment of sorrow for his recantation. On the accession of Elizabeth in 1558 he returned to England, was one of the sixteen Protestant divines appointed by the queen to discuss the leading points of dispute in Westminster Abbey with the same number of Roman Catholics, held a place in the commission which visited the different dioceses in the south-west of England for the purpose of rooting out Popery, and early in 1560 was consecrated Bishop of Salisbury. He discharged his episcopal duties, and at the same time prosecuted his studies with a diligence under which his constitution soon gave way; and while engaged on a preaching tour he was taken ill, and died at Monkton Farleigh, in Wiltshire, in 1571, in the fiftieth year of his age. His works, chiefly on the points of the Popish controversy, are still held in high esteem; and one of them, a small treatise entitled Apology for the Church of England, Apologia Ecclesiæ Anglicanæ (1562), not only received a wide circulation on the Continent, from being published in Latin, but has been translated into most European languages. The estimation in which it was held in England may be estimated by the fact that three sovereigns, Elizabeth, James I., and Charles I., and four successive archbishops, ordered a copy of it to be chained up for perusal in all parish churches. In 1567 he published a Defence of the Apology.

JEWELLERY is a term applied generally to the setting of gems or precious stones and the manufacture of personal and other ornaments in gold and silver, and also to the articles manufactured. It is a branch of the art and trade of the goldsmith. *Jewelling* is the term applied to the setting of diamonds or other hard stones in frame-plates for purposes of art, particularly as supports for the pivots of watches to work in.

JEWS, the modern name of the descendants of Abraham, who were first called *Hebrews*, from Heber, which is considered by some authorities as a patronymic, by others as a gentile name, indicating the country east of the Euphrates, from which they originally came; afterwards Israelites, from Israel, the name given to Jacob after his wrestling with the angel; and finally Jews, because after the Babylonish captivity the majority of those who returned to the land of Canaan belonged to the tribe of Judah. The history of the Jews presents the peculiarity of being largely mixed up with divine interposition. While God suffered all nations to walk in their own way, he chose Abraham, their ancestor, as the father of a chosen race who were to be governed by his laws, and to make his will known to all the world. The main authorities for the earlier period of the history of this people, as the Hebrews or Israelites, down to the Babylonish captivity, are the canonical books of Scriptures, particularly the five books of Moses, the books of Joshua, Ruth, Judges, Samuel, Kings, Chronicles, and some of the prophetic writings, particularly Isaiah and Jeremiah. One of the most formidable difficulties of Hebrew history, as of all early history, is its chronology; for although a distinct chronology is given in the different books of Scripture, its interpretation and harmonization, as well as its synchronization with that of surrounding history, is a matter of extreme difficulty. As our space will not permit of our discussing these difficulties, or giving the views of the various authorities, we can only give dates as an approximation in the case of particular events without assuming any complete system or method of chronology.

When the earth had been repeopled after the flood by the descendants of Noah the sacred historian records (Gen. xi.) that the earth was all of one language, and that having in the course of migration from the east reached the plain of Shinar, they proposed building a city with a tower whose top should reach to heaven, lest they should be scattered abroad upon the face of the earth. This ambitious plan was frustrated by divine interference. By confounding the speech of the builders, so that they could not understand each other, God caused them to leave off their work and disperse over the face of the earth. The human scheme of unity being thus defeated, another scheme was commenced by God himself in the call of Abraham, a descendant of Shem. This patriarch, whose original name was Abram, was dwelling in Ur of the Chaldees, apparently in idolatry, to which the greater part of the world had sunk, when God called him to go forth from his kindred and the place of his nativity unto a land which he should show him, promising to bless him and to make him a blessing; and that in him (Gen. xii. 4), or in his seed (Gen. xxii. 18), all the families of the earth should be blessed. As a seal of this covenant he gave him the sign of circumcision, commanding that every man-child of his race should be circumcised at the age of eight days. Abraham was called to sojourn in the land of Canaan, which was to be given to his seed, who were to be as the stars of heaven for multitude. Abraham sojourned in this land with his nephew Lot, the son of Haran. Both of them were exceedingly rich in cattle, so that Lot at length removed to the east of the Jordan to find room for his flocks; but Abraham had no territorial possessions, having to purchase a burying-place for his wife Sarah from the children of Heth, which was transferred to him with considerable legal formality (Gen. xxiii. 17, 18). The blessing

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bestowed on Abraham was transferred to Isaac, his son by Sarah, the daughter of his brother Haran. The trial of his faith by the command from God to offer up as a sacrifice his son Isaac is well known. Ishmael, his son by Hagar, and also other sons by his wife Keturah, are mentioned, the former as the ancestor of the Ishmaelites, the latter of considerable eastern families or nations. The date of the call of Abraham is given by Ussher as B.C. 1921. Isaac married his cousin Rebecca, by whom he had twin sons, Esau the elder, the ancestor of the Edomites, and Jacob the younger, of the promised seed. Jacob had two wives, also of his own kindred, and two concubines, the handmaids of his wives, by whom he had twelve sons, commonly called the twelve patriarchs, who were the ancestors of the twelve tribes of Israel. The names of the patriarchs were Reuben, Simeon, Levi, Judah, Issachar, and Zebulun, sons of Leah; Joseph and Benjamin, sons of Rachel; Dan and Naphtali, sons of Bilhah; and Gad and Asher, sons of Zilpah. The history of this family was eventful, and their characters various. Jacob had to flee from his father's house in consequence of having deceived his father and his brother Esau. He was meanly treated by his uncle Laban, but married his daughters and grew rich in his service. He received the name Israel when he wrestled successfully with an angel previous to returning to meet his brother Esau. This name, the derivation of which is somewhat doubtful, but which is commonly taken to mean a 'prince with God,' was adopted as a title of honour by his descendants. The sons of Jacob, with the exception of Joseph and perhaps of Benjamin, of whom little is known, were not, in early life at least, distinguished by the piety of their ancestors. Reuben, the eldest, lay with Bilhah, his father's concubine. Simeon and Levi treacherously slew the people of Shalem, a city of the Hivites, in revenge for the violation of their sister Dinah by Shechem their prince. Of Judah various discreditable amours are recorded, and the brothers collectively sold Joseph to a band of Ishmaelites to be carried as a slave to Egypt, through which eventually was fulfilled a prophecy made to Abraham that his seed should sojourn in that land 400 years, a period which is usually calculated from the time of Abraham. The history of Joseph, the most interesting episode of this period, occupies most of chaps. xxxvii. and xxxix.–l. of the book of Genesis. He was raised by means of his virtue and through the providence of God to be ruler under Pharaoh over the land of Egypt, when, a famine arising in Canaan, his father and his whole family went down to him and were assigned by Pharaoh the land of Goshen as a residence. Jacob on his death-bed bestowed prophetic blessings on his sons. Reuben, Simeon, and Levi were, for the offences already mentioned, passed over, and the promise of the Messiah, now made more explicitly, given to Judah, whose intercession to Joseph in favour of his brother Benjamin had given evidence of a loftier character than his early irregularities promised. Joseph received that part of the birthright which consisted in a double portion, his two sons, Manasseh and Ephraim, being adopted by Jacob and made the heads of tribes, the number being subsequently reduced to twelve by the setting apart of the tribe of Levi to the priestly office. After this—but how long after we are not told—a new king arose who knew not Joseph. The Israelites were oppressed and brought into bondage, and the exactions upon them became grievous, arbitrary, and unreasonable. When they had been reduced to the lowest condition God raised up a deliverer for them in the person of Moses. The scriptural record does not give any explicit information either as to the name of the particular King of Egypt under whom the Israelites were brought into bondage, or of the king in whose reign Moses effected their deliverance. Even the capital in which these monarchs held sway is a matter of conjecture. According to some authorities the Pharaoh who began to oppress the Israelites was Rhamses II., the national hero of the Egyptians, and their deliverance took place under his son. In Ex. i. 11 it is said that the Israelites built for Pharaoh treasure cities, Pithom and Raamses. From the expression 'now there arose a new king over Egypt which knew not Joseph,' a change of dynasty has been inferred, but whether this is consistent with the reasoning of this king as recorded in Ex. i. 9, 10 may very well be doubted. The language of Pharaoh to his people may indeed be consistent with a purely dynastic change, but is certainly not that of a conqueror addressing a conquered people. The chronology of the epoch and of contemporaneous Egyptian history is, however, so uncertain, that even assuming a change of dynasty, authorities have not been able to decide to what particular dynasty those transactions are to be assigned. The entire number of Jacob's family when he went into Egypt was seventy persons, and when they were brought into bondage they are represented by the jealous king as more and mightier than the Egyptians. They must therefore for a considerable part of the period of their sojourn in Egypt have enjoyed freedom. According to the received chronology (Ussher) the Israelites left Egypt in B.C. 1491, crossing the Red Sea on 11th May. Moses was the great-grandson of Levi by a long-lived ancestry. The oppression of the Israelites had begun some time before his birth, but owing to a succession of remarkable circumstances (see MOSES) he was adopted by Pharaoh's daughter and brought up at court. When he was forty years of age he fled to Midian after killing an Egyptian who had oppressed one of his brethren, and after other forty years passed here God appeared to him in a burning bush and commanded him to go to the deliverance of Israel. The details of his mission are known to every reader of Bible history. The children of Israel passed forty years in the desert before proceeding to the conquest of Canaan promised to their ancestors. Here God, by the ministration of angels, as it is said in the New Testament (Acts vi. 38, 53; Heb. ii. 2), gave them the law of the ten commandments on Mount Sinai, and in a series of communications to Moses the whole polity by which they were to be governed as a people was revealed. A ceremonial of sacrifice was instituted, and Aaron, the elder brother of Moses and his sons consecrated as a hereditary priesthood. The nation was established as a THEOCRACY. It was to be governed by judges appointed and inspired by God, and to have no king. In the desert it was marshalled in four divisions or groups of three tribes, each of which separately had its standard, its prince or leader, and its proper quarter assigned to it. They were fed with manna or 'bread from heaven,' and as a visible manifestation of God's presence their journeyings were regulated by a pillar of cloud which went before them by day, and which was changed into a pillar of fire by night. Two censuses of the men capable of bearing arms (twenty years old and upwards) among the Israelites were taken, one at the beginning the other at the close of their forty years' wanderings. The total of the first enumeration was 603,550, of the second 601,730. The Levites, who were not reckoned among the warriors, are given in the first census at 22,000, in the second at 23,000. In both censuses Judah is the most populous tribe.

Joshua, who succeeded Moses, led the Israelites to the conquest of Canaan. This was effected, according to Ussher, between 1451 and 1445 B.C. The land was

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throughout the East, as it was probably rendered necessary by the number of *hellenized* Jews (Jews using the Greek language) in Egypt and elsewhere. Onias II., the high-priest, interrupted the good understanding with Egypt at the beginning of the reign of Ptolemy III. by neglecting through avarice to pay the annual tribute of 20 talents; but his nephew Joseph prevented a rupture by farming the revenue and establishing a civil government independent of the high-priest. Antiochus III. (the Great) made war on Ptolemy IV. to recover Palestine, with other provinces of the Syrian Empire. Ptolemy defeated him at Raphia, near Gaza, B.C. 217. After his victory Ptolemy went to Jerusalem and profaned the temple by entering the holy of holies. On his return he persecuted the Jews of Alexandria, thus alienating the whole race. After the death of Ptolemy Philopater Antiochus the Great became master of Palestine (B.C. 198). The conquered provinces were bestowed as a dowry on Cleopatra, the daughter of Antiochus, who married Ptolemy Epiphanes, but Antiochus never gave up possession, and in B.C. 188 formally resumed them in his treaty with the Romans. An Egyptian and a Syrian party now arose among the Jews, and gave occasion to civil dissensions. The latter party began to hellenize the customs of the Jews, and the high-priesthood itself, already an object of ambition, became one of intrigue and bribery. Jason, who became high-priest in this way (B.C. 175–172), tempted by the quinquennial games, sent offerings to the Tyrian Hercules, apparently the first instance since the captivity of homage offered by the Jews to idolatry. Revolting crimes followed this declension from the national faith. Antiochus IV., after a successful war with Egypt, led by the civil contentions of the Jews to believe they had revolted, invaded Judæa B.C. 170, took Jerusalem by storm, slaughtering the inhabitants without distinction of age or sex, profaned the temple by sprinkling swine's broth over the sanctuary, and carried off the sacred vessels. Two years afterwards a frightful slaughter of the Jews took place under his deputy Apollonius. Antiochus Epiphanes then issued an edict of uniformity of religion, and commenced an exterminating persecution against the Jews. The Samaritans submitted without resistance, and their temple on Mount Gerizim was dedicated to Zeus Xenius; the temple at Jerusalem was polluted by the worship of Zeus Olympius. Those who adhered to their own religion were compelled to eat swine's flesh, and subjected to the most horrible tortures and death on refusal. This was the martyr age of the Jewish Church, and many, both old and young, endured all sufferings for their religion with heroism. When the persecution under Antiochus Epiphanes had served the much-needed purpose of recalling the nation from its threatened apostasy it called forth a resistance which took form under the leadership of the Maccabees. This family, previously called Asmonæan from a former ancestor, derived their new title from a surname bestowed on Judas, their most renowned head, derived, as is generally supposed, from *Maccabah*, a hammer. Mattathias, a priest probably of the house of Eleazar, the son of Aaron, had five sons, John, Simon, Judas, Eleazar, and Jonathan. When called upon by the king's officers at Modin, where he resided, to obey the royal edict, he indignantly refused on behalf of himself and family. The compliance of other Jews so roused his religious zeal that he slew one of the apostates, together with the king's commissioner, before the altar, and raising the standard of rebellion, retired with his sons to the mountains. Mattathias died B.C. 167, after appointing Judas (see JUDAS MACCABÆUS) who had already shown his capacity for command, as his successor. Judas, after repeatedly defeating the lieutenants of Antiochus Epiphanes, Antiochus Eupater, and Demetrius Soter, and virtually establishing the independence of the Jews, perished in battle in B.C. 161. His brother Jonathan succeeded him as leader of the patriotic party. In the dispute between Alexander Balas and Demetrius for the Syrian crown he was courted by both. Alexander bestowed the high-priesthood on him, which he assumed B.C. 153. On the death of Jonathan, B.C. 143, who was seized B.C. 144, and put to death in the following year by Tryphon, lieutenant of Antiochus VI., Simon succeeded as leader. He completed the conquest of Judæa by reducing the tower of Jerusalem, B.C. 142. He was treacherously killed, together with his son Judas, B.C. 135. John Hyrcanus, his son, completed the independence of Judæa, conquered Samaria and Idumæa, and extended his dominion over the ancient limits of the Holy Land. During his reign the rival sects of the Pharisees and Sadducees became established, and towards its close he joined the latter.

Aristobulus I., the son of Hyrcanus, assumed the title of king, which was held by his successors. From the death of Hyrcanus to the time of Herod (B.C. 37) was a period of declension and disorder, distinguished by dynastic quarrels, murders, and massacres. These dissensions led the way to the intervention of the Romans (B.C. 64). Pompey took Jerusalem (B.C. 63), entered the temple, and penetrated to the holy of holies. He established Hyrcanus as governor of Judæa Proper. Gabinius deprived him of the supreme power, and established five sanhedrims, which governed in different districts, till Julius Cæsar restored Hyrcanus, B.C. 47. His confidant, Antipater, an Idumæan, was made procurator of Judæa. Herod, the son of Antipater, who entirely threw off Jewish manners and cultivated the favour of the Romans, was declared King of Judæa by the Roman senate. He besieged and took Jerusalem B.C. 37, and having married Mariamne, the grand-daughter of Hyrcanus, and caused the last of the Asmonæans to be put to death, remained in undisputed possession of the kingdom. Herod was a man of boundless ambition, and sedulously cultivated his Roman masters. He was the friend of Mark Antony, and afterwards of Octavius. He was magnificent in his undertakings. He rebuilt the temple at Jerusalem in a Græco-Roman style. He also rebuilt the Samaritan temple on Mount Gerizim, which had been destroyed by John Hyrcanus. He also built the city of Cæsarea, which he meant for his capital, and in which he made provision for heathen worship. His cruelties were equal to his ambition. The revolts of the people, which were often excited by his Gentile tendencies, were put down with a relentless hand. His domestic history was a frightful succession of the darkest intrigues. He put to death his favourite wife Mariamne and her sons, and just before his own death he caused his eldest son Antipater, whom he had intended as his successor, to be put to death. It was towards the close of his reign that that event occurred which, little noticed by the secular historians of the period, was destined to be the turning-point of history. Jesus Christ was born in Bethlehem. The arrival of the magi in Jerusalem aroused the jealousy of Herod, already at the point of death. The *massacre of the innocents* took place shortly before the death of his own son, and Herod expired B.C. 4. Herod left a numerous family, whose names are frequently mentioned in the New Testament. The sons of his first two wives, Doris and Mariamne, namely, Antipater, Aristobulus, and Alexander, were executed in their father's lifetime. Aristobulus left Herod

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Hebrew allies turned against them, and they were pursued with slaughter to their own borders. On issuing from this victory Saul was met by Samuel, who condemned him to lose his kingdom for having in his impatience usurped the right of sacrifice. This sentence was confirmed when Saul, sent by Samuel to exterminate the Amalekites, spared Agag their king in violation of the divine command, and David was anointed to succeed him. Saul, however, was not immediately superseded. He continued to organize the forces of Israel, and to fight with varying success against their enemies on every side, Moab, Ammon, Edom, the kings of Zobah, and the Philistines. David, the son of Jesse, a Bethlehemite of the tribe of Judah, 'the man after God's own heart,' who was appointed to succeed Saul, was destined to be the ancestor of a line of kings, and the progenitor of the promised Messiah. The story of his ancestry is told in the book of Ruth, a sort of appendix to that of Judges. After he was anointed by Samuel he distinguished himself by slaying Goliath of Gath, the champion of the Philistines, and was appointed Saul's armour-bearer. The jealousy of the king was roused by hearing the women sing, 'Saul hath slain his thousands and David his ten thousands.' He also learned that David had been appointed his successor and became his inveterate persecutor. At length Saul was called out to battle against the Philistines, and in great distress he went to a witch at Endor, who at his request called up Samuel, and the prophet predicted his death and that of his sons, which took place accordingly at the battle on Mount Gilboa, on the following day. The time assigned to the reign of Saul is B.C. 1095–55. On the death of Saul David succeeded him at once as king of Judah, but Ishbosheth was crowned king of Israel by Abner, the captain of Saul's host. During a war of seven years David continued to make head against Saul's feeble successor. Abner deserted to him, but was treacherously killed by Joab, the crafty and ambitious leader of David's host, to whom Abner's military reputation gave umbrage, and the slaughter of his brother in battle a motive of revenge. Ishbosheth was soon after assassinated by his own servants, and David became king over the whole land. By the success which attended his arms and those of Joab, his commander-in-chief, he extended his dominions throughout the whole of Palestine, subdued the Philistines, Moabites, Syrians of Damascus, Edomites, Ammonites, and Amalekites, rendering many of the surrounding nations tributary. One of the most notable incidents of his reign was the rebellion of his son Absalom, who was followed at first by the whole of Israel, but not by the trained warriors of David. Absalom was defeated in the wood of Ephraim, and slain by Joab in contempt of David's injunction to spare his life. Towards the close of his reign he incurred the wrath of Jehovah by taking a census of the people, contrary to the divine command, and brought a pestilence on Israel. On this occasion things are so curiously reversed that Joab appears as the advocate of piety and moderation, and obeys the king's command with evident reluctance. An aversion to unnecessary crimes seems to have been a point in the character of this astute individual. It is also curious that David, whose confessed weakness it was to yield to Joab when he was in the wrong, succeeded on this occasion in rendering him obedient. The numbers of this forbidden census are variously given in 2 Sam. xxiv. 9 and 1 Chr. xxi. 5. In the former passage there are 800,000 valiant men of Israel and 500,000 men of Judah; in the latter there are of Israel 1,100,000, and of Judah 470,000 that drew sword, and it is added that 'Levi and Benjamin counted he not among them; for the king's word was abominable to Joab.' David's reign in Hebron extended from B.C. 1055–48, and in Jerusalem from B.C. 1048–15. He committed one great crime in his adultery with Bathsheba, and the murder of her husband Uriah; for which he found a ready instrument in Joab, who seemed to regard it as a sort of justification of his own delinquencies. But this was an exception to his general character, and was the occasion of deep humiliation and repentance, as indicated in his Psalms. In general his piety was as distinguished as his valour, and his reign was the reign of justice and clemency to his own subjects. His wars, it is true, were conducted with an exterminating rigour, for which there are two justifications. His enemies were the enemies of the Lord, some of them were devoted to destruction by divine command, and he deemed it a religious duty to break the power of all by every available means. Clemency to the surrounding nations was clemency to those who had so often seduced his people from their allegiance to Jehovah. Moreover, in his day, the laws of war were very different from what they are in modern times, and the circumstances of the Israelites may have made it almost a necessity to take advantage of their full rigour. David's severity to his enemies is certainly considered as no reproach by the historians of Scripture. Towards the close of his reign there was a revolt headed by Joab, to place his son Adonijah on the throne, but it was easily suppressed. Solomon, his appointed successor, was peaceably crowned, and Adonijah and Joab paid the penalty of their rebellion with their lives. The reign of Solomon (B.C. 1015–975) was entirely peaceful. In it, owing to the victories of David, the prosperity of Israel had reached its highest point. His dominion extended from the border of Tyre to the border of Egypt, or the Gulf of Akabah on the Red Sea. Surrounding nations paid him homage, and distant kings brought him gifts. The Moabites, Edomites, Ammonites, and even the Syrians to the Euphrates were tributary. His alliances with Tyre and Egypt enabled him to carry on an extensive and lucrative commerce. His riches and wisdom were celebrated over all the East. The latter, which brought the Queen of Sheba from the south of Arabia to hear it, was a divinely communicated gift (1 Ki. iii.) He built the splendid temple of the Lord in Jerusalem, for which David had made preparation. Its foundation was laid in the fourth year of his reign, it was finished in the eleventh, and dedicated in the following year with great pomp. Solomon married the daughter of Pharaoh, but he followed the eastern custom of polygamy. His harem was the largest on record, and his alliance must have been widely courted, as he had 700 wives that were princesses, besides 300 concubines. When he was old it is recorded that his wives turned away his heart after other gods. He built high-places in Jerusalem for the idols of the Moabites, the Ammonites, the Sidonians, and the Canaanites. For this offence it was predicted by the prophet Ahijah that the kingdom should be rent and ten tribes given to Jeroboam, the servant of Solomon. This came to pass on his death. The splendour of Solomon's reign had entailed heavy exactions upon his people. When Rehoboam, Solomon's son, succeeded, they came with Jeroboam at their head and demanded that he should make their yoke lighter. Rehoboam answered scornfully, whereupon the ten tribes revolted and set up Jeroboam on the throne. From this time the Kingdoms of Israel and Judah, to the latter of which the tribe of Benjamin adhered, are distinct kingdoms. This division entailed the speedy loss of the acquisitions made in the reigns of David and Solomon. The division was less unequal than might be supposed from the respective numbers

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preserved their existence, but obtained them influence and authority. They made themselves masters of the commerce of the old world, and, as moneylenders and brokers, were often of great importance to princes and nobles; and during the dreadful persecutions which they underwent from the cruelty of the Christians even after the seventh century, they still continued prosperous in those countries, even during the periods in which they suffered most. Their own usury and the rapacity of the Christians, rather than religious hatred, were the true causes of these persecutions. The most dreadful crimes and all public calamities were attributed to them by the Christians, as a pretext for ridding themselves of troublesome creditors, or for obtaining possession of their treasures either by their execution or banishment; but their wealth and adroitness had rendered them so important that they were always able, eventually, to secure the protection of spiritual and temporal rulers. They lived more happily among the Mohammedans, although they were distinguished by dishonourable badges and oppressed by heavy taxes; and during the Moorish supremacy in Spain their prosperity was increasing and their learning flourishing.

In the cities of France, Germany, and Italy, after the eleventh century, particular streets and inclosed places were assigned to them, in consequence of which, in the persecutions during the Crusades, thousands often fell victims at once to the popular fury. Decrees of councils and the ordinances of secular rulers repeatedly declared the Jews incapable of enjoying the civil rights of Christians and of holding public offices. They could nowhere be domiciliated, nor attached to any guild or corporation; but, in consideration of the payment of certain sums of money, they enjoyed the immediate protection of the sovereign, who in his financial embarrassments obliged them to make repeated contributions. In Germany they paid a considerable tax, in return for which they were protected as the money agents (*Kammerknechte*) of the Holy Roman Empire, as they are denominated in an imperial letter of protection. Their conversion to Christianity could not be effected by such treatment. In Spain and Portugal, indeed, at the end of the fifteenth century they yielded to force, and suffered themselves to be baptized *en masse*, but as soon as the storm was over they were seen again in the synagogues. The superstition of the fifteenth century, whose worship of saints and relics must have appeared to them idolatry, might well persuade them that their own pure monotheism was more rational and scriptural. From this circumstance, and from their pride in the antiquity of their nation and constitution, we may infer how many of those who publicly professed to be converts to Christianity, and were called in Portugal *new Christians*, and who might attain to a noble rank and even to high church dignities, were still in private Jews, continuing scrupulously to observe the Mosaic ceremonies. The Portuguese Jews, on account of their connection with these secret adherents to Judaism, have been particularly respectable, and are in possession of large landed estates. The Dutch Jews, chiefly fugitives from Portugal, were once distinguished for their immense wealth. In all places the Jews have a peculiar character. Their confinement to employments which depend principally on ingenuity and cunning, has had a debasing effect on the great body of them. In modern times, however, distinguished scholars, philosophers, artists, physicians, and merchants have been found among them, as Spinoza, Moses Mendelssohn, Heinrich Heine, Meyerbeer, &c.

The philosophical spirit of the last half of the eighteenth century first began to acknowledge the rights of the Jews. Plans for the improvement of their political and moral condition were discussed, and afterwards, by the benevolence of some governments, carried into execution, but with little and often with no success. The only consequence of the great sanhedrim, to which the Emperor Napoleon summoned 100 rich Jews (1806), was an imperial decree soon after declaring those Jews only to be French citizens who were occupied in some useful employment; but they were still drawn as conscripts. The German princes were more desirous to give the rights of citizenship to the Jews. The disabilities to which they had hitherto been subject were removed, civil privileges were granted to them, the Israelitish consistory was established in Cassel under the Westphalian government for the improvement of their worship and their schools. Still more important are the improvements in the Jewish schools in Austria, where there are academies for rabbins at Prague and Lemberg; in Bavaria, where there is a similar institution at Furth; and in the Prussian states, where they acquired all civil rights in 1811. There is no distinction whatever between Jews and Christians by the constitution of the United States, but in some of the states certain officers, as the governor, counsellors, representatives, are required to profess under oath their belief in the Christian religion. After repeated unsuccessful attempts to procure their admission into the British Parliament, the object was at last effected by an act passed in 1858, which permits Jews to take the oaths to government without the addition of the words, 'on the true faith of a Christian,' a declaration hitherto required from all members of Parliament previous to taking their seats in the house. In France the Chamber of Deputies voted in 1830 that the Jewish ministers of worship should be paid from the public chest, like the Christian. In Germany a number of Jews have abandoned the system of the rabbins, and perform divine worship in the German language in a manner approaching that of the Christians. In general the Jews, since the cessation of persecution, have shown more disposition, while retaining their religion, to conform themselves to the manners and interest themselves in the institutions of the peoples among whom they live. For the national language and literature of the Jews, see HEBREWS.

JEW'S-HARP (etymology unknown) is a toy musical instrument held between the teeth, which gives a sound by the motion of a tongue of steel, which, being struck by the hand, plays against the breath.

JEYPUR, or JYEPUR, a principality, Hindustan, Ajmir, one of the eastern Rajput states, tributary to the British, between lat. 26° and 28° N.; capital, Jeypur; area, 14,465 square miles. The soil is in general sandy and strongly impregnated with salt, large quantities of which are manufactured for exportation. Certain parts of the state produce wheat, cotton, and tobacco. Sheep are reared in some localities for their wool, and in most parts there are good cattle; herds of deer also roam over large tracts. In some of the towns cloth, swords, and matchlocks are manufactured. Most of the villages are fortified with walls and ditches. It contains some of the strongest fortresses in Hindustan. Pop. in 1881, 2,534,739.

JEYPUR, a town, Hindustan, Ajmir, capital of the principality of same name, in a valley 150 miles S.S.W. of Delhi. It is surrounded by a substantial stone wall, and defended by a citadel and outworks; and is remarkably well built, consisting of streets and squares lined with houses, generally large and handsome, and adorned with marble porticoes and

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stucco façades. The principal buildings are a magnificent palace and several beautiful temples. Pop. about 60,000.

JHANSI, a town and fort, Hindustan, Bandalkhand, capital of a small principality, 62 miles south-east of Gwalior. It has considerable manufactures of bows, arrows, spears, and carpets, and is a great thoroughfare between the Deccan and the upper provinces of Bengal. It is pleasantly situated amid tanks and groves of fine timber trees; is surrounded by a fortified and massive wall from 6 to 12 feet thick, and from 18 to 30 feet high, with numerous flanking bastions, mounted as batteries with ordnance, and with loopholes for musketry. Within the town, which has a circuit of about 4½ miles, and surrounded by it on all sides except the west and part of the south, stands the fort on an elevated rock, completely commanding the town and the surrounding country. Its natural strength has been so much increased by art as to make its capture even by regular siege a task of no small difficulty. During the mutiny Jhansi acquired an infamous notoriety. The European residents, who had defended themselves in the fort after the mutiny of the Sepoys, were barbarously massacred in violation of a capitulation in June, 1857. Sir Hugh Rose captured the fort on 2d January, 1858, when 5000 of the rebels were slain.

JHILAM, JELUM, JHYLUM, JAILUM, or BEHUT (anciently *Hydaspes*), the most westerly of the five great rivers that intersect the Panjab, east from the Indus. It rises in Cashmere, then taking a sharp bend it flows nearly south, forming the boundary between Cashmere and the Panjab, then south-west through the Panjab, and finally falls into the Chenab, at lat. 31° 10′ N.; lon. 72° 9′ E.; 75 miles N.N.E. Mooltan. The whole course of the Jhilam through the valley of Cashmere, before it finds an outlet through the Pass of Baramula, is, including windings, about 120 miles, for 70 of which it is navigable. It is navigable also from its junction with the Chenab up nearly to its emergence from the mountains. It abounds in fish, and is infested by alligators. Entire course, about 450 miles.

JIB, a large triangular sail set on a stay forward. It extends from the outer end of the jib-boom towards the fore-top-mast head; in cutters and sloops it is on the bowsprit, and extends towards the lowest mast-head. The jib-boom is a continuation of the bowsprit forward, being a spar run out from the extremity in a similar manner to a top-mast on a lower mast, and serving to extend the foot of the jib and the stay of the fore-top-gallant-mast, the tack of the jib being lashed to it.

JIDDAH, DJIDDAH, or JEDDAH, a town and seaport, one of the chief trading ports of Arabia, in the province of Hejaz, on the Red Sea, 60 miles west of Mecca, of which it is the port; on a low, sandy, and extensive plain, badly supplied with water, in front of a range of hills 10 miles from the sea. It is of a square form, about 1500 paces in length, and half as many in width, and is inclosed by a wall, with small towers at intervals, and having two forts with about ten embrasures each, at the angles towards the sea; but there are few guns mounted. A long well-built street of two-storied houses, lined with shops, and containing several good khans, runs parallel to the sea. The port, which is very indifferent, has two paltry quays, adapted for small vessels only; the larger being obliged to anchor in the roadstead, about 2 miles from the shore, where there is excellent anchorage. It has a very mixed and stirring active population, carrying on a considerable trade with India, Egypt, Africa, and Arabia; many of its merchants are very wealthy. Jiddah was bombarded by the British in 1858, in retribution of a massacre of the British consul and others by the inhabitants. The population is estimated at from 12,000 to 20,000; or, including the suburbs, which are squalid in the extreme, some make the total 40,000.

JITOMIR, or ZYTOMIR, a town of Russia, capital of the government of Volhynia, on the left bank of the Teterew, 670 miles S.S.W. St. Petersburg. It is the see both of a Greek and a Roman Catholic bishop, has manufactures of leather and hats, an active trade in woollen, linen, and silk goods, wax, honey, Hungarian wines, salt, and tallow; also four important annual fairs. Pop. 37,640.

JOAB was the son of Zeruiah, the sister of David, and the captain of David's host or commander-in-chief of his army during his whole reign. He appears to have been a follower of David during the reign of Saul, but is first mentioned as the leader of David's men in an expedition against Abner, the captain of Ishbosheth. That he was already well known is, however, evident from Abner's reluctance to slay his brother Asahel, who was pursuing him. Abner's remonstrance, 'how then should I hold up my face to thy brother Joab?' evidently indicates the respect inspired by an inflexible character. When Joab treacherously murdered Abner in revenge for the death of Asahel, David, who abhorred, dared not punish the deed, and his exclamation, 'these sons of Zeruiah are too strong for me,' showed the ascendency which Joab had acquired over his royal master. After David had been established king in Jerusalem, Joab conducted all his wars with uniform success. He remained faithful to him during the rebellion of Absalom. When he had slain that ungrateful son contrary to the command of David, David made a weak attempt to supersede him in favour of Amasa, the general of Absalom. Joab, ever unscrupulous when his ambition was concerned, slew Amasa and resumed his post, a proceeding in which the king, whose consent was not asked, tacitly acquiesced. In compensation for his own crimes he committed one for David by assisting in the murder of Uriah the Hittite. Towards the close of David's reign he joined in the rebellion of Adonijah, for which Solomon, by the advice of David, put him to death. He possessed the character not only of an able military leader but of an astute statesman, and when his personal ambition did not interfere gave many remarkable proofs of steadfastness and moderation.

JOACHIMSTHAL, a town of Bohemia, circle Elnbogen, on the Weseritz, in a valley between lofty mountains of the Erzgebirge, near the frontiers of Saxony, 70 miles W.N.W. Prague. It is the seat of a mining directory, contains a deanery and several other churches, and depends chiefly on the valuable lead and silver mines which are worked in the vicinity. *Thaler* pieces were first coined here. Pop. in 1880, 5336.

JOAN, the papess, according to a story long believed, but now acknowledged to be a fiction, was a native of Mainz, of the name of Gilberta or Agnes, who, falling in love with an Englishman at Fulda, went to travel with him, studied at Athens, and visited Rome. Continuing to conceal her sex, she took the name Johannes Angelicus, and rose, by her talents, from the station of a notary to the Papal chair, under the name of John VIII. (854 to 856, between Leo IV. and Benedict III.) She governed well, but having become pregnant by a servant, or, according to some, by a cardinal, she was delivered in a solemn procession, and died on the spot, near the Coliseum, which place the popes are said to have avoided ever after in their processions. The story seems to have arisen about the end of the twelfth century, and was much discussed at the period of the Reformation. Its historical groundlessness was de-

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monstrated by Blondel, a Protestant divine—Eclaircissement de la question si une femme a été assise au siége papal de Rome entre Leon 4 et Benoist 3, par Dav. Blondel, Amsterdam, 1647.

JOANNINA. See JANINA.

JOAN OF ARC (*Jeanne d'Arc*—properly *Darc*), the Maid of Orleans. The belief, prevalent in the middle ages, that particular individuals were gifted with supernatural powers as instruments of a higher will, explains the extraordinary character and conduct of the Maid of Orleans. After the death of Charles VI., king of France, in 1422, Henry VI. of England, then a child of nine months old, was proclaimed King of France, according to the Treaty of Troyes (1420); his uncle, the Duke of Bedford, acted as regent. France had been distracted for forty-two years by civil dissensions. On one side were Queen Isabella, the Duke of Burgundy, and England; on the other the Dauphin Charles, who had been abandoned by his own mother, and was supported by the Orleans party. This division, and the talents of the English generals, the Earls of Somerset, Warwick, Salisbury, Suffolk, Arundel, Talbot, and Fastolfe, had reduced nearly all France to the dominion of England. The dauphin, a youth of nineteen, was crowned at Poictiers as King Charles VII. He possessed many qualities proper for interesting his countrymen in his favour, and was wanting only in firmness and resolution. Still he maintained himself in France for the space of seven years. At length Bourges, and the territory belonging to it, were nearly all that remained to him. Paris and the north of France, as far as the Loire, were in possession of the English. Salisbury had been besieging Orleans since October 12, 1428. The city was bravely defended by Gaucour. Its fall would have ruined the cause of Charles. In the valleys of the Vosges, on the old frontiers of Lorraine, in the village of Domrémy la Pucelle, on the banks of the Meuse, lived a peasant girl, Jeanne Darc, whose parents were common country people of reputable character, and in good circumstances for their station. She was born, according to recent authorities, at Domrémy, Basse Lorraine, in 1409, of Jacques Darc and Isabella Romée. In the midst of timid and superstitious persons, who were in continual trouble and alarm at the misfortunes of their country, Joan was quietly occupied in domestic employments, and sometimes in driving the cattle to pasture. She was of a delicate frame, and uncommon sensibility of temperament. Her enthusiasm, and her habits of solitary meditation, explain the angelic voices and visions of the maid. While her companions were sporting beneath the Fairies' tree, the beautiful May (*le beau Mai ou l'arbre des fées*), not far from the fountain of Domrémy—a tree which was once sacred to the Druids, and famous in many a ghostly tale—Joan was singing and dancing by herself in pious enthusiasm, and binding garlands for the holy Virgin, in the little chapel of 'our lady of Bellemont,' which she usually visited on Saturday. Commanded, as she asserted, by a vision of our lady of Bellemont to raise the siege of Orleans and to conduct Charles to Rheims to be crowned, she presented herself in February, 1429, to the governor of Vaucouleurs, Robert of Baudricourt, who at first thought her possessed, and twice dismissed her; but upon her returning a third time he sent her to Chinon with letters of recommendation. Here the dauphin ordered her to be examined by the Bishop of Meaux and John Morin. She is also said to have immediately pointed out the king, whom she had never seen, and who had purposely mixed among his courtiers, and to have repeated to him a prayer which he had made to the Virgin Mary. It is certain that she was examined for three weeks by many intelligent men, counsellors of parliament and divines. She was then secretly inspected by the dauphin's mother-in-law and her court ladies, who declared her to be a true virgin (*qu'elle était un entière et vraie pucelle*). At length, being satisfied of the truth of her claims, D'Aulon, the most virtuous man at court, was appointed to be her constant attendant and brother in arms, and she received permission to hasten with Dunois to the deliverance of Orleans. From this period she appears the finest character in the history of the middle ages of France. In a male dress, armed *cap à pie*, she bore the sword and the sacred banner, as the signal of victory at the head of the army. Still no unfeminine cruelty ever stained her conduct. She was wounded several times herself, but never killed any one, or shed any blood with her own hand. It is shown also, by the documents of her trial, and of the subsequent revision of it, that she had not killed any of the enemy with her own hand, from a tenderness of conscience, and was even more anxious about the souls than the bodies of the English who were slain. Nevertheless, it would seem that she did not always carry the banner, and actually made use of the consecrated sword in case of necessity. This sword was taken by her directions from the church of St. Catharine at Fierbois, where, according to the story, nobody had before known of its existence. After sunset she avoided the company of men, passed her nights with women, and kept all loose females, as much as possible, away from the camp. The general belief of her elevated mission, of which she herself was piously persuaded, produced the most extraordinary effects. Resolute, chivalrous, pious, and brave, looking to one single aim, she was skilfully employed by the generals to animate the army, while they did not implicitly follow her counsels. The first enterprise was successful. With 10,000 men, under the command of St. Severre, Dunois, and La Hire, she marched from Blois, and on the 29th April, 1429, entered Orleans with supplies. By bold sallies, to which she animated the besieged, the English were forced from their intrenchments, and Suffolk abandoned the siege (May 8, 1429). Joan next captured several places in the enemy's possession, and defeated them in a battle near Patay, where Talbot was taken, and the valiant Fastolfe himself was forced to flee. Charles entered Rheims in triumph. At the anointing and coronation of the king, July 17, Joan stood at his side. In full armour, and bearing the banner, she took the office of a constable, and held the sword over the king. Her commission having been thus fulfilled, she wished to return to her home, but was prevailed upon to stay. All France now acknowledged Charles as king; and Bedford could only maintain himself by valour and prudence. He repulsed, in September, the assault upon Paris. Here Joan was wounded, and Charles retired to Bourges. A title of nobility was now conferred on the heroine and her family. She was first called *Dalis*, then *Dulis*, and finally *Dy Lys;* her coat of arms contained two golden lilies and a sword pointing upwards and bearing a crown. Meanwhile Bedford was assembling new forces. Burgundy and Brittany still acknowledged the young King Henry VI., who had been crowned at Paris. Thus strengthened, the English again pushed on and besieged Compiègne. The maid threw herself into the town, as she had done at Orleans, but in a sally, May 25, 1430, was taken prisoner by the Burgundians. She surrendered to Lyonnel, the bastard of Vendôme. She was at first confined at Crotoy, but afterwards at Beaurevoir. Upon hearing that she was to be delivered to the English she attempted to escape by leaping from a window of the castle, and was seriously

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injured. In this condition she came into the power of the English. At the instigation of her own countrymen Pierre Cauchon, bishop of Beauvais, instituted a process against her, and the University of Paris demanded her execution. She was condemned by the church as a sorceress and heretic. After four months' imprisonment the innocent enthusiast, who had resolutely defended herself, and at the examination had named St. Michael as the angel whose voice she had heard in her father's garden, in her fifteenth year, and as her constant guardian and attendant, was sentenced, by the inquisitors at Rouen to be burned for sorcery and intercourse with infernal spirits. She was carried, May 24, 1431, to the stake, when her courage appeared to be daunted. She submitted to the church, and declared her revelations to be the work of Satan. Her punishment was then commuted to perpetual imprisonment. But pretexts were soon found to treat her as a relapsed criminal, and as such she was burned by a slow fire at Rouen, May 30, and her ashes were thrown into the Seine. She died with undaunted fortitude. When they were putting the Inquisition cap on her head, before going to the pile, she said to her attendant, 'Maître, par la grace de Dieu, je serai ce soir en paradis.' There is a tradition that when she expired a white dove was seen to rise from the pile. In 1450 and 1451 measures were taken for revising the process. In 1455 the relations of Joan applied for a revision. Pope Calixtus III. committed the affair to the Archbishop of Rheims, the Bishops of Paris and Coutance, and an inquisitor. This court pronounced, in 1456, their decision, that the twelve articles alleged against her were false, and declared her entirely innocent. Her memory was preserved by monuments. In the market-place at Rouen there is a statue of her, on which, under her coat of arms, is the inscription:—

'Regia virgineo defenditur ense corona;
Lilia virgineo tuta sub ense nitent.'

'The maiden's sword protects the royal crown;
The lilies bloom safely beneath the maiden's sword.'

According to the portrait of the maid which Alex. Lenoir discovered in the town-house at Orleans, she must have been exceedingly beautiful. Her features have a soft and enthusiastic expression: they have what the French call *l'intérêt du calme*. She has a cap with feathers on her head, and is holding in her hands a shield and the consecrated sword. A monument with her bust in marble was erected to her in Domrémy, September, 1820, which has been replaced in 1856 by a bronze statue. The Maid of Orleans has formed a favourite subject with poets, although too often with indifferent success, few of them having risen to the dignity of history. Shakespeare in Henry VI. part i., gives a version of her story which is familiar to English readers, and Southey has made her the heroine of his somewhat heavy poem Joan of Arc. Schiller has idealized her character in a fine drama. Among her own countrymen Chapelain has made himself if not his subject ridiculous in his interminable poem of La Pucelle; Voltaire has unpatriotically assailed her character in a burlesque poem, in which he followed Shakespeare; Soumet, De Lavigne, Ozaneaux, and others have celebrated her with more or less success; but none of them can yet be said to have raised a worthy monument to her fame. Of historical research there has also been an ample store. We may cite Procès de condamnation et de rehabilitation de Jeanne Darc par M. J. Quicherat, in the collection of the Société de l'histoire de France (1849–51, five vols. 8vo); and Jeanne Darc par Henri Martin (1857), a work which contains the results of the latest investigations.

JOB, the hero of an ancient Hebrew poem, which has been preserved to us in the canon of the Old Testament. It has been much disputed whether Job is a real or fictitious personage; whether the poem is epic, didactic, or dramatic; who is the author; what was his age and country; and when and where the scene is laid. The work has been attributed to Job himself, Moses, Elihu, Solomon, and others. The scene of the poem (the land of Uz) is supposed to be in Arabia; but the time is by some placed in the age of the patriarchs, and by others after the Babylonish captivity. The design of the work seems to be a justification of divine Providence, and the inculcating a submission to the divine dispensations. The scene is partly in heaven and partly on earth; the actors are Satan, Job, and his four friends Eliphaz, Bildad, Zophar, and Elihu. Job, an upright man, with a family of seven sons and three daughters, with large herds and numerous servants, is suddenly, with the permission of Jehovah and by the agency of Satan, deprived of his possessions and his children, yet submits patiently to the divine will. He is then further tried by the infliction of a sore disease, yet is silent. Three friends come to console him; but struck with his desolate condition, they burst into lamentations, and sit down with him seven days in silence, 'for they see that his grief is very great.' At the end of this period the grief of Job finally breaks out into bitter complaints. The remainder of the poem is occupied with the speeches of his friends, who attribute his misfortunes to wickedness and hypocrisy, and his replies to them until the close, when God himself is introduced answering Job out of a whirlwind. In the sequel Job is delivered from his calamities, lives 140 years, becomes richer than he had been before, and begets seven sons and three daughters. The whole poem is characterized by freshness and truth of colouring, simplicity and dignity of manner, and loftiness and purity of sentiment. Intensity of passion is combined in a striking manner with deep views of the nature of man and the providence of God. The best critics at the present day hold that the book of Job rests mainly on facts, though in its form and general features, its reasonings and representations of character, it is a work of creative genius. With regard to the period at which it was written, we may look upon it as a settled point that the book belongs to a period long anterior to the captivity, and indeed there is nothing to prove that it was later than the Pentateuch. It bears the stamp of antiquity throughout in the patriarchal simplicity of manners it describes, and it does not even allude to the Mosaic law. That the author was a Hebrew there is little doubt.

JOCASTA (also *Epicasta*), daughter of Menœceus, sister of Creon and wife of the Theban king Laius, by whom she had Œdipus. After having unconsciously slain his own father Laius, Œdipus solved the riddle of the Sphinx, and received as his reward the hand of Jocasta, his own mother (of which circumstance he was ignorant). After the error was discovered Jocasta hanged herself in despair. See ŒDIPUS.

JODELLE, ETIENNE, born at Paris, 1532, wrote the first regular tragedies and comedies for the French stage. Among the former are Cléopâtre captive and Didon se sacrifiant. His comedy Eugène was praised by Ronsard. Though Jodelle enjoyed the favour of Charles IX. and of Henry II. he died in great poverty in 1573. He was a member of the Pleiad of Charles IX.

JODHPUR, JOUDPORE, or MARWAR, a town in the north-west of Hindustan, capital of the principality of same name, which forms the largest of the Rajput states, 285 miles E.N.E. of Haidarabad (on

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the Indus). It stands on an affluent of the Luni, in a hollow inclosed by rocky eminences, on which are three forts, and is a large place surrounded by walls. One of the forts contains the palace of the rajah, which is a very extensive edifice of solid though simple architecture, and from its commanding position forms a very conspicuous object at a great distance. Pop. about 60,000.—The principality, which is about 260 miles long east to west, and nearly the same in breadth—area, 37,000 square miles—is well watered by the Luni and its affluents; and though arid in many parts, raises in others good crops of wheat, barley, millet, &c. Irrigation is well understood and generally practised. Besides grain, considerable quantities of inferior opium and some tobacco are raised. The most important mineral product is salt. The general, and especially the transit trade, is very important, and has its central locality at Pallee, which stands about 40 miles south-east of the capital, and is the entrepôt between the west coast and Upper India. The principal article is opium, of which 2000 camel-loads are frequently exported. Next in importance to it are wheat and salt. The camels of the country also are celebrated, and are in great demand in the surrounding territories. The whole transport of goods throughout Jodhpur is performed by them. Owing to the absence of hills, there are few strongholds. Pop. in 1881, 1,750,403.

JOEL, one of the twelve minor prophets. The time and place of his birth and the date of his prophecy are unknown. He is generally supposed to be contemporaneous with Hosea and Amos. The immediate occasion of his prophecy was a protracted drought and a visitation of locusts and other destructive vermin, but it expands in a style of high sublimity into predictions of future prosperity when the divine judgments should have purified the nation. Joel is quoted by St. Peter, Acts ii. 16-21.

JOHANNISBERG, a village of Prussia, province of Nassau, on a rising ground above the right bank of the Rhine, about 12 miles west by south of Mainz. Near it on a hill stands the castle of Johannisberg belonging to the Metternich family, and rising conspicuously among the vineyards which produce the Johannisberg, the finest of the Rhenish wines. The monks are said to have planted the first vines of Johannisberg. According to ancient chronicles Ruthard, archbishop of Mainz, founded in 1009, upon the hill where the castle stands, a priory, converted twenty years after into a monastery, and secularized in 1567, after having been burned in 1522. The castle was built in 1722 by the Abbot of Fulda, who replanted the vineyard. It was given to Marshal Kellermann by Napoleon I. in 1807; in 1816 Prince Metternich received it. The best grapes are those next the castle, called Schloss-Johannisberg. The wine sells at a very high price.

JOHN, called the *Baptist*, the forerunner of Christ, was born six months before Jesus (their mothers were relations) of a Levitical family in Judæa, and his birth was attended with circumstances (Luke, chap. i.) which marked him out as one chosen by God to accomplish the divine purposes. He chose the austere course of life suited to a person dedicated to God, and by his early simplicity in food and dress, by his solitary meditations on and deep knowledge of the spirit of the Holy Scriptures, obtained that independence and strength of mind which made him the object of universal admiration when he appeared in the character of a prophet. His teachings were earnest exhortations to repentance and preparation for the kingdom of heaven, which he announced to be at hand. His preaching, as recorded in the Gospels, was severe and powerful. He proclaimed himself the harbinger of a greater who should come after him, and fulfilled his mission to prepare for him the way with a zeal equalled only by his self-denial and humility. He baptized many converts to his doctrine, and obtained respect among all classes by the contrast of his severe virtue with the corruption of the times. When the higher mission of Jesus was made known at the time of his baptism in the Jordan, John pointed his disciples to this new Master, and saw without envy his own words fulfilled, 'He must increase, but I must decrease.' He coveted no fame, and wished no further success. He desired only to maintain the right of speaking the truth, and fell a victim to his boldness. To gratify a vindictive woman Herod Antipas, tetrarch of Galilee, caused him to be beheaded in prison. A number of his disciples continued faithful to him till death, and are said to have established the still existing sect of Sabians or St. John Christians in Persia, distinguished for their veneration of John the Baptist.

JOHN, one of the apostles, commonly known as 'the disciple whom Jesus loved,' and the reputed author of the fourth Gospel, three epistles, and the Revelation, is one of the most prominent characters in New Testament history. John was the son of Zebedee and the brother of James. He is usually supposed to have been younger than his brother, and to have been born a few years before the commencement of the Christian era. His mother's name is conjectured from Matthew xxvii. 56 and Mark xv. 40 to have been Salome. Previous to his call by Jesus he was a fisherman on the Sea of Galilee, together with his father, his brother, and Simon Peter and Andrew, who were his partners. From the mention of hired servants along with his father, and of boats and nets which were probably their own property, the family seem to have been well-to-do in their class. John was probably a disciple of John the Baptist, and was most likely one of the two mentioned in John i. 35, the other being his companion Andrew. There are two versions given of his call—Matthew iv. 18-22, Luke v. 1-11. From this time he became a constant attendant on our Lord throughout his ministry. He was called to be one of the twelve apostles, and together with Peter and his brother James was admitted to a more confidential intercourse than the others. He was with them at the transfiguration in the garden of Gethsemane, and on many other occasions when these three were singled out from their comrades. He even enjoyed a special distinction among this smaller band, and is mentioned at the last supper as leaning on Jesus' breast. In the trying scenes from the crucifixion to the resurrection his fidelity to his Lord and the simplicity of his faith are strongly manifested. He is also represented, both in the Gospels and in the Acts, as on terms of peculiar intimacy and friendship with the apostle Peter. His Gospel was written later than any of the others—according to some critics to refute particular heresies, but in all probability with a much more general aim. It contains much fuller details of our Lord's conversation and discourses than the other Gospels, and is also more doctrinal and much bolder in its speculations. The three epistles have much doctrinal resemblance to the Gospel, especially in inculcating the cardinal principle of love, which is the first principle of all the teaching of this apostle. The Revelation, after a series of hortatory epistles to the seven churches in Asia, opens up a series of visions, in which, through an imagery of the most complicated kind, chiefly borrowed from the older prophets, particularly Daniel, and a peculiar chronology of days, which is also found in that prophet, future events are predicted to the end of the world. It is designed as the closing book of the New Testa-

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ment, the canon of which, according to tradition, was made up by St. John himself. It closes with a prediction of Christ's second coming, and a solemn malediction against him who takes from or adds to the words of the books. Of the history of John after the events recorded in the Gospels and the Acts comparatively little is known. He was banished, probably by Domitian, to the island of Patmos, where he saw the visions recorded in the Revelation. After this it is generally understood that he took up his abode in Ephesus, and that he lived till the reign of Trojan, but the time of his death is not known. The stories told of him by tradition are numerous, and it gives him various disciples, as Polycarp, Ignatius, &c., but not much of this can be depended on, and most of these apocryphal stories are distinguished by a sentimentality or extravagance very much opposed to the true character of the apostle, which was eminently simple, and with all its tenderness not without an element of sternness, which earned for him, along with his brother, the epithet of Boanerges (sons of thunder).

JOHN, the name of twenty-three popes, the last of whom died in 1419. That no subsequent pope has called himself John is probably owing to the polluted character of several of the name, and particularly the public condemnation of the last for atrocious crimes. Among these pontiffs are the following:—

JOHN I. (*St. John*), succeeded Hormisdas in 523, and was a friend of Boethius, who dedicated to him several of his works. Theodoric sent him to Constantinople, to induce the Emperor Justin to adopt milder measures towards the Arians. Though John was received with uncommon pomp, his mission was fruitless, and on his return Theodoric threw him and his companions into prison, where he died in 526. His day is May 27.

JOHN VIII., a Roman, was pope from 872 to 882. The Saracens during his pontificate pushed their ravages to the gates of Rome, and he was compelled in 877 to pay them tribute. He crowned three emperors, Charles the Bald, 875; Louis the Stammerer, 878; and Charles the Fat, 881. Having to flee from Rome, he held the Council of Troyes in 878. He was very liberal in excommunications, and launched several against robbers by whom, in his journeys, he had been despoiled. He suffered a violent death.

JOHN XI., son of Marozia and the pope Sergius III., was born in 906. He was elected pope while under age in 931, and governed through the influence of his mother. His brother Alberic revolted and imprisoned the pope and his mother in the castle of St. Angelo, where John died in 936.

JOHN XII. (*Octavian*), son of Alberic and grandson of Marozia, though an ecclesiastic, succeeded to the dignity of his father, a patrician of Rome, and in 956, after the death of Agapetus II., possessed himself of the tiara, though only eighteen years old. He was the first pope who changed his name on his accession to the Papal dignity. He applied to the emperor Otho I. for assistance against Berengarius II., crowned the emperor, 962, and swore allegiance to him, but soon after revolted against Otho, who caused him to be deposed by a council, in 963, and Leo VIII. to be elected. On Otho's death, in 964, John returned and excommunicated his rival. He died in the same year. He polluted the Papal see by the most revolting licentiousness.

JOHN XIII., a Roman, made pope in 965 by the influence of the emperor, for which the nobles of Rome hated and expelled him. Otho II. restored him to Rome, and was crowned by him. He distinguished his restoration by horrible cruelties. The Poles and Hungarians were converted during his pontificate. He died in 972.

JOHN XXII. (*Jacques D'Euse*), a native of Cahors, chancellor of Robert, son of Charles II. of Naples, was Archbishop of Avignon, and was elected pope at Lyons in 1316, after the death of Clement V. He resided at Avignon, but had many adherents in Italy. He is important in German history on account of the active part he took in the disputes of the emperors Louis of Bavaria and Frederick of Austria. He died in 1334, after having been once deposed by Louis, who caused Nicolas V. to be elected in his stead. Philip of Valois threatened to burn him alive as a heretic for maintaining that the blessed do not enjoy the vision of God till the resurrection, and he was compelled to retract. He published in 1317 the Constitutions of Clement V., a manual of canon law, since known by the title Clementines. He was also the author of the decretals called Extravagantes. See CANON LAW.

JOHN XXIII. (*Balthasar Cossa*), born in Naples, was a pirate in his youth, afterwards became an ecclesiastic, studied at Bologna, was made a *doctor juris*, and was elected pope in 1410, by the Council of Pisa, after the death of Alexander V., on condition that, if Gregory XII. and Benedict XIII. would resign, he would also retire to end the schism. He summoned the Council of Constance, demanded by the Emperor Sigismund, in 1415, where he appeared in person, and confirmed his resignation, March 2; but, March 20, he fled secretly from Constance to Schaffhausen, and revoked his resignation. He was cited before the council, but not appearing, he was suspended, and finally deposed, May 29, for seventy crimes (malice, tyranny, incest, licentiousness of all kinds, intercourse with his brother's wife and with 300 nuns, simony, murder, &c.), attested by thirty-seven witnesses. He was confined in the castle of Gottleben, near Constance. The elector of the Palatinate was then charged with his safe-keeping, and he remained at Mannheim and Heidelberg under custody. Four years after he was released on the payment of 30,000 gold guilders, went to Italy, and threw himself at the feet of Pope Martin V., in Florence, who pardoned him and made him cardinal, Bishop of Tuscoli, and dean of the college of cardinals. He died 22d November, 1419.

JOHN, King of England, born in 1166, was the youngest son of Henry II., by Eleanor of Guienne. Ireland being intended for his appanage, he was sent over in 1185 to complete the conquest; but such was the imprudence and insolence of himself and his courtiers, that it was found necessary to recall him. Although his father's favourite, he joined his brother Richard in his last unnatural rebellion, and shared with him the curse pronounced by the king on his death-bed. He was left without any particular provision, which procured for him the name of *Sans Terre* or Lackland; but Richard, on his accession, conferred on him the earldom of Mortaigne, in Normandy, and various large possessions in England, and married him to the rich heiress of the Earl of Gloucester. This kindness did not prevent him from forming intrigues against his brother, in conjunction with Philip of France, during his absence in Palestine; but Richard magnanimously pardoned him on his return, and left him his kingdom in preference to Arthur of Brittany, the son of his elder brother Geoffry. So imperfectly was the rule of primogeniture then established in this country, that no disturbance whatever ensued, although the French provinces of Anjou, Touraine, and Maine declared for Arthur, who was taken under the protection of the King of France. A war ensued, in which John recovered his revolted provinces, and received homage from Arthur for the duchy of Brittany inherited from his mother. In 1200 he married Isabella of Angoulême, after

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divorcing his first wife. In 1201 some disturbances again broke out in France, whither he led another expedition; and the young Arthur, having joined the malcontents, was captured and confined in the castle of Falaise, whence he was subsequently removed to Rouen, and never heard of more. The manner of his death is not certainly known; but it was generally believed that John stabbed him with his own hand, and the king now became the object of universal detestation. The states of Brittany summoned him to answer the charge of murder before his liege lord King Philip; and upon his refusal to appear, the latter assumed the execution of the sentence of forfeiture against him, and in this manner the whole of Normandy was recovered by the French crown, after its alienation for three centuries. John laid the fault of his disgrace upon his English nobles, whom he harassed by fines and confiscations; but after some ineffectual attempts, he was obliged to acquiesce in a truce in 1206. The pope at this time was the haughty and able Innocent III., who, in consequence of a contested election for the see of Canterbury, nominated a creature of his own, Cardinal Stephen Langton. John, highly enraged, acted with his usual haste and folly, and displayed so much contempt for the Papal authority that Innocent laid the whole kingdom under an interdict. This quarrel lasted some years, and the king, by his tyranny, depriving himself of the support of his nobles, was perplexed on every side. In order to give some lustre to his degraded administration he undertook expeditions into Scotland, Wales, and Ireland, in which he was successful, and, in particular, quelled all opposition to his authority in the last country. In the meantime the court of Rome excommunicated the king personally, and formally absolved his subjects from their allegiance. Philip of France was again ready to put the sentence against John into execution, and prepared an expedition in the ports of Picardy, which, however, the latter was enabled to oppose. So much disaffection, nevertheless, prevailed, that Pandulph, the pope's legate, induced him not only to receive Langton as Archbishop of Canterbury, but abjectly to resign his kingdoms of England and Ireland to the holy see, in order to receive them again as its vassal, with absolution. This ignominious compact was executed at Dover in May, 1213; and the pope, now regarding England as his own, and jealous of the aggrandizement of Philip, required the latter to desist from hostilities against a country under the protection of the see of Rome. Philip received this mandate with great indignation, but, in consequence of a victory over his fleet, was gradually brought to reason. Flushed with this success John resolved to endeavour to recover his continental dominions, but the English barons declined the service. In the next year, however, he carried over an army to Poitou; but after some partial successes, was obliged to return in disgrace. John had by this time rendered himself the object of such universal contempt and hatred, that his nobles, who had long felt aggrieved by the usurpation of their sovereigns, and of the reigning one in particular, determined to seize upon so favourable an opportunity to control his power and establish their privileges. Langton produced to them a copy of the charter of rights granted by Henry I., and at a general meeting in London in January, 1215, they laid their demands before the king, which he attempted to elude by delay. In the meantime he sought to ingratiate himself with the clergy and the pope, with whom he lodged an appeal against the compulsory proceedings of the barons. The politic pontiff, who found it his interest to support a sovereign who had so far humbled himself, declared his disapprobation of their conduct; but, little moved by the declaration, the latter assembled in arms at Oxford, where the court then was, and choosing a general, immediately proceeded to warlike operations. They were received without opposition in London, which so intimidated the king, that he consented to sign such articles of agreement as they thought fit to dictate. Such were the steps which produced the Magna Charta, which was signed by John at Runnymede, on the banks of the Thames, June 15, 1215. The passive manner in which John yielded to these restrictions of his power indicated a secret intention of freeing himself from his obligations. In order to lull the barons into security, he dismissed his foreign forces, but, in the meantime, was secretly employed in raising fresh mercenaries, and in seeking the concurrence of the pope, who issued a bull annihilating the charter as extorted from his vassal contrary to the interests of the holy see. He even forbade John to pay any regard to its conditions, and pronounced a sentence of excommunication on all who should attempt to enforce it. Thus furnished with spiritual and temporal arms, the king left his retreat and carried war and devastation through the kingdom. His barons, taken by surprise, could make no effectual resistance, and, despairing of mercy from John, sent a deputation to France, in which they offered the crown of England to the dauphin Louis. Philip gladly accepted the proposal, and Louis, with a fleet of 680 vessels, landed at Sandwich, 30th May, 1216, and proceeded to London, where he was received, 2d June, as lawful sovereign. John was immediately deserted by all his foreign troops and most of his English adherents; but Louis lost much time in the siege of Dover, and his treatment of the English nobles began to alienate his adherents. While the king's affairs were beginning to assume a better aspect, he had the misfortune, in a march from Lynn across the sands into Lincolnshire, to lose, by the sudden flow of the tide, all his carriages and baggage. After this misfortune he proceeded to the Cistercian Abbey of Swineshead, where he passed the night. A gluttonous repast of pears or peaches and new cider, of which he partook here, brought on a fever, and he died at Newark, October, 1216, in the forty-ninth year of his age, and seventeenth of his reign. No prince in English history has been handed down to posterity in blacker colours than John, to whom ingratitude, perfidy, and cruelty were habitual. Apparent gleams of vigour and energy were, indeed, occasionally manifest; but they always proved mere explosions of rage, and soon subsided into meanness and pusillanimity. His private life was stained with extreme licentiousness, and the best part of his conduct as a ruler was the attention he paid to commerce and maritime affairs. More charters of boroughs and incorporations for mercantile pursuits date from him than from any other of the early kings, and the popular constitution of the city of London was his gift. He left, by his second wife, a family of two sons and three daughters, and had many illegitimate children.

JOHN I. (*João*), King of Portugal, surnamed the *Great*, founder of the dynasty of Avis. He was the natural son of Pedro the Severe, king of Portugal, and at seven years of age was created grand-master of the order of Avis. Ferdinand, the legitimate son of Pedro, having died in 1383 without male heirs, the succession was claimed by Castile in the right of Beites or Beatrice, wife of Juan I. While this matter was under discussion Eleanora, widow of Ferdinand, was declared administratrix of the kingdom. The conduct of the queen, and particularly her scandalous love for a favourite, Anderio, rendered her unpopular with the Portuguese. John, encouraged by the popular dislike, murdered this favourite

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in the palace, 6th December, 1383. On the 16th of the same month he was by popular acclaim declared defender and governor of the kingdom, which was equivalent to a delaration of war with Spain. He did not immediately claim the crown, but set up as a pretender Don João, the son of Pedro by Ines de Castro. During the war with Castile this pretence was set aside, and on 6th April, 1385, he assumed the sovereignty. The strong places of the kingdom were still in the possession of the nobles who adhered to Queen Beatrice, but they were gradually reduced, and Juan, king of Castile, who besieged Lisbon with a large force, including the disaffected Portuguese, was defeated 14th August, 1385, at Aljubarotta. Having been relieved from his vow of chastity he married Philippa, daughter of John of Gaunt, 2d February, 1387, and in the same year he concluded a ten years' truce with Castile, and which led to a definitive peace in 1399. In 1415 he made an expedition to Africa, and conquered Ceuta. He caused the laws of Portugal to be drawn up in the vulgar tongue, and it was by his ordinance that in 1422 the Christian era was substituted for the era of Cæsar. It was also in his reign and under the patronage of his son (see HENRY THE NAVIGATOR) that Portugal began that career of discovery which carried her maritime and commercial power to so high a point.

JOHN VI., King of Portugal, was born at Lisbon 13th May, 1767 (or 1769). He became director of the government in Portugal in 1792, in consequence of the mental derangement of his mother. He had been brought up chiefly by monks, and continued much under the government of his confessors, whom he frequently changed. In 1799 he assumed the title of regent. From the formation of the first coalition against France in 1793 he remained the constant ally of England against that power, unless when compelled by the preponderance of the French influence in the Peninsula to make peace or purchase neutrality. Napoleon having at length determined on the conquest of the Peninsula entered on the short-lived Treaty of Fontainebleau for the partition of Portugal between Spain and France (27th Oct. 1807). The king, who at this time displayed some symptoms of his mother's malady, embarked with his family for Brazil on 27th November, and three days afterwards Junot entered Lisbon. From his new seat of government he entered into a closer alliance with England (19th February, 1810), and the resources of Portugal were placed at the disposal of that power during the Peninsular war, which finally restored him to his European kingdom. On 16th December, 1815, he raised Brazil to the rank of a kingdom; and on the death of his mother he was recognized (16th March, 1816) as King of Portugal. In July, 1821, he returned to Portugal, and in 1822 swore to observe the constitution framed by the cortes in the previous year. A counter-revolution was attempted by the royalists, headed by his son Don Miguel, and during a succession of intrigues and revolts the king uniformly sided with the strongest party. On 5th November, 1825, he recognized the independence of Brazil, which he had at first attempted to resist. He died at Lisbon 10th March, 1826.

JOHN II., surnamed the *Good*, King of France, a monarch distinguished alike for his incapacity and his misfortunes. He succeeded his father, Philip of Valois, in 1350. Although the country was at war with England he began his reign by dissipating his treasures to supply the extravagance of his courtiers. He then had recourse to debasing the coinage, and when this failed called the states-general in 1351. When Edward III. invaded France in 1355 he was again obliged to have recourse to the states-general for supplies; but on this occasion the states, which could not trust him, established a control over the treasury with a stringency which savours of modern times. The imposts imposed by the states were made common to the three orders, which was obnoxious to the nobility, some of whom resisted. The king now added violence to improvidence. He seized the Count d'Harcourt, a companion of his son, at a feast to which the dauphin had invited him, and caused him to be summarily executed. John was defeated and made prisoner at the battle of Poitiers, 19th Sept. 1356, and released at a heavy expense to his country at the Peace of Brétigny in 1360. On his return he imposed new taxes on the impoverished country, which he accompanied with promises of reform in which no one trusted. He founded the second house of Burgundy by bestowing that province on his son, Philip the Hardy, and thus prepared the way for a long succession of misfortunes to France. While engaged on an expensive progress through the kingdom John, all whose good qualities seemed to belong to the chivalric class, learned that the Duke of Anjou, his son, who had been left as a hostage in England, had effected his escape. To redeem his parole he returned to London, a rare instance of fidelity in monarchs, although it has been suspected that the embarrassed state of his affairs in France had some influence on his resolution. He passed the winter in London, according to Froissart, in great rejoicings and recreations, in dinners, suppers, and other sorts of feasting. Those convivialities proved too much for him, and he died in London, 8th April, 1364.

JOHN III. (*Sobieski*), King of Poland, son of Mark Sobieski, a Polish captain, was born at Olesko, in Galicia, in 1624. He set out on travel at an early age along with his brother Mark, stayed some time in France, and entered the musketeers (*rouges*). Condé, for whom he had a warm admiration, received him into his favour, and maintained a correspondence with him till the close of his life. The two brothers afterwards visited Turkey; but hearing of the invasion of Poland by the Cossacks they hastily returned (1648), and took part at the head of their vassals in numerous encounters with the enemy. Mark was taken prisoner at the battle of Batov, 2d June, 1652, and put to death, when John became the head of his house. John Cassimir appointed him standard-bearer to the crown, and he distinguished himself in the war against the Russians and Swedes, which terminated with the Peace of Oliva in 1660. In 1665 he defeated the Cossacks and the Muscovites in the battle of Slobodskoi. He married this year the widow of Prince Zamoyski. In 1667 he defeated with a small force an invasion of allied Cossacks and Tartars after seventeen days' fighting. In 1669 Michael Koribut was chosen king on the resignation of John Cassimir against a party who preferred Sobieski. During the troubles consequent on this election Poland was invaded by a numerous army of Turks and Tartars. Although a price had been put on his head, Sobieski did not hesitate to take the lead in defence of his country, and defeated the enemy in a series of brilliant operations in 1671-72. Michael concluded a treaty in 1672; but the war was soon renewed, and was again successfully conducted by Sobieski, who took Choczim 10th November, 1673. On the death of Michael he was chosen king, 21st May, 1674. A new war with the Turks was concluded after varying success by a peace, 27th October, 1676. The anarchy in which Poland was constantly kept by the turbulence of its aristocracy was aggravated during the reign of Sobieski by the intrigues of his wife, and his own talent for administration was not equal to his capacity as a general. Besides internal troubles, European politics at this time occupied the attention of Sobieski,

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whose alliance was solicited both by Louis XIV. and the emperor. He at length concluded (31st March, 1683) an alliance with the latter against the Turks, who had allied themselves with the malcontents in Hungary and threatened a most formidable invasion of the empire. Sobieski was at this time so stout that the French ambassador wrote to Louis XIV. that he would never take the field; but when the Turks besieged Vienna with an army so numerous that the number of their tents is said to have exceeded 100,000, he left Cracow with 25,000 men, and uniting with the Austrian forces (September 9), at the head of a combined force of 83,000 men inflicted a decisive defeat on the Turks, and compelled them to raise the siege of Vienna, 12th September, 1683. He terminated the campaign with the capture of Gran (27th October), which had been in the possession of the Turks for nearly a century and a half. In 1686 he overran Moldavia and Walachia, but failed to make a permanent conquest. His last years were disturbed by the intrigues of his own family and the anarchy of the country, which he was unable to control, and in which he foresaw its approaching downfall. He died 17th June, 1696. Sobieski was a man of liberal education. He spoke several languages, and was a lover of science.

JOHN, DUKE OF LANCASTER, usually called *John of Gaunt*, a corruption of *Ghent*, where he was born in 1339, was fourth son of Edward II. and his queen Philippa, daughter of the Earl of Hainaut. He was created Duke of Lancaster 13th November, 1362. After making some figure in the French wars he became, on the departure of his brother Edward, Prince of Wales, governor of Guienne; and having married (1370) the daughter of Pedro IV., surnamed the Cruel, assumed in her right the title of King of Castile. On his return to England in 1374, the age of his father and the fatal illness of the Black Prince, his brother, enabled him to monopolize all the authority of government. His corrupt and tyrannical proceedings made him both obnoxious to the Parliament and unpopular with the country, though he gained some credit with a respectable minority by his patronage of Wickliffe and his followers. On the accession of his nephew, Richard II., John of Gaunt was strongly suspected of a design to usurp his place; but either because the suspicion was unfounded, or his unpopularity left him no hope of success, he remained ostensibly a faithful subject, and in 1378, in command of the English fleet, gained possession of the important town and harbour of Brest. At a later period, when war had been declared with Spain, he took the opportunity of pressing his claim to the throne of Castile; and having landed with a force at Coruña (1386), and effected a junction with the King of Portugal, who had married his eldest daughter, gained several victories, and seemed on the eve of accomplishing the object of his ambition, when his army was almost destroyed by disease and starvation, and he was glad to compromise his claim by marrying his daughter Catharine to Prince Henry, the heir of the reigning King of Castile (1388), and accepting a slump sum for his expenses, together with an annuity of 40,000 florins. On his return from Spain John of Gaunt was created Duke of Aquitaine for life. By some sudden reaction not easily explained he became extremely popular, and made such good use of the change that he paved the way for the future usurpation of his eldest son, the crafty Bolingbroke, under the title of Henry IV. He died 3d February, 1399. After his death his estates were seized by Richard II.

JOHN, KNIGHTS OF ST. The Knights of St. John, or Hospitalers of St. John, afterwards called *Knights of Rhodes*, and finally *Knights of Malta*, were a celebrated military religious order, established at the commencement of the Crusades to the Holy Land. As early as 1048 some merchants from Amalfi, in Naples, established a church at Jerusalem, and built a monastery, which they dedicated to John the Baptist. It was the duty of the monks, who were called *Brothers of St. John*, or *Hospitalers*, to take care of the poor and sick, and in general to assist pilgrims. This order, which gradually obtained important possessions, was regularly instituted as a military order in 1118 by the principal, Raymund du Puy, retaining all their former laws. Besides the performance of their vows of chastity, obedience, and poverty, it was their duty to aid in defending the church against infidels. Raymund also divided the order into three classes—knights (who should bear arms), chaplains (regular ecclesiastics), and servitors (*serventi d'armi*), whose duty it was to take care of the sick and accompany pilgrims. This order long maintained itself against the arms of the Turks and Saracens by union and courage; but in 1291 it was driven from Palestine. Upon this the knights conquered Cyprus, but soon lost it again, and established themselves in 1309 on the island of Rhodes, where they remained upwards of 200 years. This island was vigorously defended against Mohammed II. by Pierre d'Aubusson (grand-master, who died 1503). Driven thence by the Sultan Soliman II. (1522), the knights went to Candia, then to Venice, Rome, and Viterbo, and especially to Nice, Villa Franca, and Syracuse, till Charles V. (1530) granted them the islands of Malta, Gozzo, and Comino, on condition of perpetual war against the infidels and pirates, and the restoration of these islands to Naples if the order should succeed in recovering Rhodes. From this period they were commonly called *Knights of Malta*. In 1565, under the command of Lavalette (who died 1568), they repelled a violent attack from Soliman II. with great loss. After this they continued their naval battles with the Turks till modern times, and saved themselves from ruin in various wars with the Porte only by their unyielding courage. In 1760, however, they would doubtless have been overpowered but for the interposition of the French. After that their naval expeditions were seldom anything more than mere show. The chief of this order, which had great possessions in almost every part of Europe, was called *Grand-master of the Holy Hospital of St. John of Jerusalem*, and *Guardian of the Army of Jesus Christ*. He was chosen by vote, and lived at Valetta, in the island of Malta. He was addressed by foreign powers with the title of *altezza eminentissima*, and received annually 6000 crowns from the treasury of the order, together with all the revenues from the three islands. The secular power was principally in his hands, but even here he was limited by the *governors of the various languages*, so called, who gave laws, fixed taxes, &c. The spiritual power (that is, the immediate affairs of the order) was exercised by the chapter, which consisted of eight *balliri conventuali*, and in which the grand-master presided. The principal offices in the order were held by the pillars (*piliers*) of the eight languages into which the knights were divided according to their respective nations. The languages were those of Provence, Auvergne, France, Italy, Arragon, Germany, Castile, and England. From these languages the *balliri conventuali* above-mentioned were chosen, and their lands were divided into priories, these into *bailliages*, and these again into *commanderies*. Of the priories the German had the preference, and was called the *grand priory*. It was filled by the grand-prior of Germany, or the master of the Knights of St. John throughout Germany, who was a prince of the empire, and resided at Heiters-

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heim, a city and castle in Breisgau, now in the circle of Treisam, in Baden. The master of the Knights of St. John was subject to the grand-master at Malta. He himself had the jurisdiction over Brandenburg, Hungary, and Bohemia. Austria, Bohemia, and Moravia formed, besides, a separate grand-priory of the German language. Of the eight languages abovementioned the English became extinct in the sixteenth century; the three French languages perished during the revolution; those of Castile and Arragon were separated from Malta at the Peace of Amiens, and the Italian and German languages have since been abolished. Thus the order of St. John is to be regarded as extinct. The Prussian order of Knights of St. John, founded by Frederick William III., can be considered only as a memorial of an order venerable for its antiquity and its services. The Knights of St. John observed the rules of the order of St. Augustine. The Protestants, however, were not bound to celibacy. Every member was required to be of good family. The knights who could bring indubitable evidence of noble ancestry were called *caralieri di giustizia* (knights by right). Those, on the contrary, who could not prove their nobility, but were nevertheless received on account of their merits, were called *caralieri di grazia* (knights by favour). The duty of each knight—to take the field at least three times against the infidels or the pirates of Barbary—was rarely performed in recent times, and by the Peace of Amiens all hostilities against the Turks were forbidden. In peace these knights wore a long black mantle; a gold cross of eight points, enamelled white: in war they wore a red jacket or tabard, charged with a full white cross. Only in spiritual concerns was the order subject to the pope; in all temporal ones they enjoyed unlimited sovereignty. Their naval force, in 1770, consisted of four galleys, three galliots, four ships of sixty, and two frigates of thirty-six guns, with numerous smaller vessels. When Malta was unexpectedly attacked by Bonaparte, June 8, 1798, the island capitulated without resistance. In 1800 the British reduced it by famine, and it has been ever since in our hands. At the Peace of Amiens (1802) it was stipulated that the island should be restored to the knights, under the guarantee of a neutral power; but as our government continued to entertain apprehensions lest the French would retake Malta, and thus destroy our superiority in the Mediterranean, we continued in possession of it. December 16, 1798, the order had chosen for their grand-master the Russian emperor, Paul I., who declared the capitulation of 1798 an act of treachery, and took the Knights of St. John under his protection. This choice met with much opposition, even from the pope himself. After the death of Paul I. (February 9, 1805) the pope appointed an Italian (Tommasi) grand-master, and on his decease the grand chapter chose Caracciolo. The chief seat of the order had been, hitherto, Catania in Sicily. In 1826 the pope permitted the chapter and the government to remove their seat to Ferrara. Before the French revolution the number of knights of this order was estimated at 3000.

JOHN, St., a seaport of the Dominion of Canada, largest town of the province of New Brunswick, on a rocky peninsula projecting into the harbour, at the mouth of the river St. John. It stands on rugged and uneven ground; but the streets are regularly laid out and well built, though some of them are inconveniently steep. The upper portion, rebuilt since the great fire of 1877, stands on solid rock. The buildings are principally of brick, and many of the public structures have a respectable and even elegant appearance. The custom-house and post-office are fine buildings. The harbour is commodious, safe, and never obstructed by ice. At its mouth is Partridge Island, having a battery, light-house, and an hospital for sick emigrants on their arrival in the country. The fishery within the harbour is valuable, yielding large quantities of herrings, salmon, shad, &c. The commerce carried on by St. John is large, it being the commercial capital of New Brunswick, and being favourably situated for trading. The principal imports consist of British manufactures, sugar, tobacco, and other colonial produce; while the exports are timber, fish, furs, cattle, &c. Next to Quebec St. John is the chief timber port of Canada. Ship-building is carried on to a great extent, and a large amount of shipping is owned here. The city is the centre of the railway system of New Brunswick. St. John was founded by American loyalists in the latter part of last century; and though it has frequently suffered from severe conflagrations, it has steadily continued to improve and prosper. St. John returns three members to the Canadian House of Commons, and six to the Provincial Legislature of New Brunswick. The population in 1881 exclusive of suburbs was 26,127.

JOHN, St., a river which rises in the United States, near the source of the Connecticut, and after flowing north-east through Lower Canada for about 200 miles, enters New Brunswick, near the parallel of 47° N., when it takes a south-east direction, and after a total course of about 450 miles falls into the Bay of Fundy by an estuary 5 miles wide, at the city of St. John. Its navigation is obstructed by several falls and rapids; one of which, called the Rugged Narrows, occurs about a mile above the city of St. John. Nevertheless large and handsome steamers ply upon the river from St. John to Fredericton, the capital of New Brunswick, a distance of 84 miles. The chief falls (Grand Falls) occur shortly after the river enters New Brunswick, and extend over half a mile, in which distance it falls 75 feet. The river is navigable for vessels drawing little water up to the foot of these falls.

JOHN BULL, a name first used by Arbuthnot and since popularized as a typical name suggesting a humorous or burlesque representation of the English character, similar to *Paddy* for an Irishman, *Sawney* for a Scot, and *Jonathan* for an American. The idea conveyed by so purely an imaginative designation is very apt to vary, but with the English themselves bluntness, honesty, liberality, and good humour, with a slight liability to be imposed on, but no disposition to be seriously trifled with, are the leading characteristics. The foreign notions of John Bull vary much more than the native one, and are often very wide of the mark. They do not usually contain so much of the element of simplicity, and frequently supply its place with cunning, combativeness, or insular rudeness and vulgarity.

JOHN CHRYSOSTOM. See CHRYSOSTOM.

JOHN DORY. See DORY.

JOHN OF LEYDEN. See ANABAPTISTS.

JOHN OF NEPOMUK. See NEPOMUK.

JOHN O' GROAT'S HOUSE (properly *Johnny Groat's House*), a house formerly situated about 1½ mile west of Duncansby Head, and forming about the most northern extremity of the mainland of Great Britain. John Groat or Groot was a real personage. According to tradition three brothers of this name settled in Caithness and acquired some lands about Duncansby in the reign of James IV. When they had increased to eight families a dispute arose as to precedence at an annual festival. John Groat settled the controversy by building an octagonal house with a door at each side and an eight-sided table, so that each could enter by his own door and sit at the head of the table. The family of Groat

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continued in possession of lands here till the middle of last century. The house has now entirely disappeared; but there is now here a commodious hotel for the accommodation of the numerous tourists.

JOHN'S, EVE OF SAINT. A popular celebration of remote antiquity is connected with the festival of Saint John the Baptist, 24th June, and takes place on the vigil or eve preceding the festival, being Midsummer eve. This celebration is generally agreed to be an instance of the custom of the propagandists of the Roman Catholic religion of adapting heathen rites to the worship of their church, but antiquarians differ as to the particular source of the ceremonies of this celebration, some giving it a Parsee, others, perhaps with more probability, a Druidical origin. The distinguishing characteristic of this celebration is the lighting of bon-fires (*feux de joie*). It is still held in the Ukraine, in Roumania, in Spain, and particularly in Brittany, Poitou, and Alsace. The time of the celebration differs in different places. In Roumania it is held in the early days of spring, in the Ukraine in the beginning of June. Fires are lighted at short distances in solitary places, so as not to set fire to the villages, and the young men and women dance round them all night. The same custom prevails in France. In England the people went into the woods and broke down branches from the trees, which they planted over their doors with great rejoicings. In France the festival is now only celebrated in villages and in particular provinces. Formerly it was universal, and was observed even in the largest towns. In Paris it was only put a stop to at the revolution. The fire of St. John was lighted by the municipality in the Place de Grève with a great pile of wood. The governor of Paris, the provost of merchants, and all the public officials made the tour of the place three times, escorted by the guards of the town. At the third turn the provost fired the pile. Sometimes the king honoured the fête with his presence, and set fire to the pile in person. The people danced round the fire in a very lascivious manner. Discharges of artillery preceded and accompanied the lighting of the fire, and live cats sewn in sacks were thrown into it. Balls were held in the Hotel de Ville for the élite of the townspeople. In Ireland this festival is associated with a highly poetical fancy or superstition. It is believed that the souls of all people during this night leave their bodies and wander to the spot where death is to overtake them. Another form of this superstition entertained in England was that if any one sat up fasting all night in the church porch he would see the spirits of all who were to die in the parish during the ensuing twelve months come and knock at the church door in the order in which they were to die.

JOHN'S, ST., a town of British North America, capital of the island and colony of Newfoundland, near the extremity of the most eastern of the numerous peninsulas which project from the eastern portion of the island. The houses are either of stone, brick, or wood, and the town has been much improved since the fire of 1846, both as regards the style of building and the width and regularity of the streets. The public buildings are the government house, a large plain structure; house of assembly, a handsome building of granite; a Roman Catholic and a Church of England cathedral; a lunatic asylum, hospital, and the market and custom-houses, the upper story of the former used as a court-room. There are several societies, religious and benevolent, a mechanics' institute, with museum, library, and reading-room attached. The trade of St. John's consists chiefly in supplying the fishermen, most of whom are Roman Catholics, with clothing, provisions, and fishing and hunting gear. The harbour of St. John's is excellent, although narrow at the entrance; the channel, from point to point, being only 360 fathoms wide. The narrows leading to the harbour are protected by batteries and fortifications. During the spring season the harbour is thronged with merchant vessels from European and American ports with supplies for the fishery. Besides its fisheries, St. John's is extensively engaged in sealing. The trade is principally with Great Britain, and the chief exports are fish and train-oil. There are foundries, breweries, tanneries, biscuit-factories, and several oil refineries. St. John's was nearly destroyed by fire in 1846. Pop. 23,890.

JOHN'S, ST., Antigua. See ANTIGUA.

JOHN SCOTUS. See ERIGENA.

JOHNSON, DR. SAMUEL, one of the most distinguished English writers of the eighteenth century. He was born at Lichfield, in Staffordshire, on the 18th September, 1709, in which city his father was a bookseller. He inherited from his father a robust body and active mind, together with a scrofulous taint, which impaired his sight and hearing, and a strong disposition to morbid melancholy. He also derived from the same source a marked attachment to high church principles, and a decided predilection for the family of Stuart. He received his early education partly at the free school of Lichfield, and partly at Stourbridge, in Worcestershire; and, on returning from school, he remained two years at home. Having acquired reputation from his exercises, particularly of the poetical class, a neighbouring gentleman of the name of Corbet offered to maintain him at Oxford as companion to his son. He was accordingly entered of Pembroke College in 1728, being then in his nineteenth year; but he exhibited no marked attention to his studies in the first instance, and the state of indigence into which he fell by the neglect of the promised assistance on the part of the family by whose advice he was sent to Oxford, produced a degree of mental anxiety which he is said to have attempted to conceal by affected frolic and turbulence. Still he acquired credit by occasional poetical compositions in the Latin language; but, after all, left Oxford, after a residence of three years, without taking a degree. About this time, according to his own account, he received a strong religious impression from the perusal of Law's Serious Call to a Devout and Holy Life. Soon after his return to Lichfield his father died insolvent, and he was constrained to accept the situation of usher at the grammar-school of Market Bosworth. This situation his impatience under the haughty treatment of the principal soon induced him to quit; and he passed some time as a guest with a medical schoolfellow, settled at Birmingham. Here he wrote essays for one of the journals, and translated from the French Father Lobo's Travels in Abyssinia. Returning to Lichfield, he published proposals for the republication of the poems of Politian, with a life, and a history of modern Latin poetry, which prospectus was but little attended to. Disappointed in this scheme he offered his services to Cave, as a contributor to the Gentleman's Magazine, which, however, was but a slight step towards a maintenance; and in 1735 he sought to improve his condition by a marriage with Mrs. Porter, the widow of a mercer. Her fortune of £800 was a dowry of some moment to a suitor in the situation of Johnson; and the fact of her being twice his own age, and possessed of no personal attraction or refinement, renders his subsequent description of this union as a 'love match on both sides' the more extraordinary. He now took a large house at Edial, near Lichfield, with a view to take pupils and boarders, but the plan did not succeed; and after a year's trial he resolved to seek his fortune in London,

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in company with one of his few pupils, the celebrated David Garrick. In March, 1737, the two adventurers accordingly arrived in the metropolis, Johnson with his unfinished tragedy of Irene in his pocket, and with little to depend upon but his slender engagement with Cave. At this time he became acquainted with the reckless and unfortunate Savage, and in some respects his personal conduct was unfavourably affected by the intimacy; but from irregularity of this nature he was soon recovered by his deeply-grounded religious and moral principles. His first literary production which attracted notice in the metropolis was his London, a Poem, in imitation of the third satire of Juvenal. He soon after made an attempt to obtain a Dublin degree of M.A., through a recommendation to Swift, in order to obtain the mastership of a free grammar-school in Leicestershire, but could not succeed. His engagement in the Gentleman's Magazine led to a new exercise of his powers in the composition of parliamentary debates, which, being then deemed a breach of privilege, were published under the fiction of Debates in the Senate of Lilliput. The extraordinary eloquence displayed in these productions was almost exclusively the product of his own invention; but it is probable that he adhered more faithfully to the tenor of the arguments of the real speakers than to their language. He, however, confesses himself, that he 'took care the Whig dogs should not have the best of it.' His attachment to the Jacobites was also further manifested by the composition of a humorous pamphlet, in 1739, entitled the Marmor Norfolciense, consisting of a supposed ancient prophecy, in Latin monkish rhymes. For some years longer the Gentleman's Magazine received the chief of his attention. For this miscellany he composed several excellent biographical articles, and in 1744 published his celebrated Life of Savage separately. In 1747, after a number of abortive projects, he sent out his plans for an English Dictionary, in an admirably composed pamphlet, addressed to the Earl of Chesterfield, who, however, concerned himself very little in the success of the undertaking. The time that he could spare from this compilation, which has been justly accounted a wonderful exertion of industry, was allotted to various literary avocations. In the same year he furnished Garrick with his admirable prologue on the opening of Drury Lane Theatre; and in 1749 published another admired imitation of Juvenal, which he entitled the Vanity of Human Wishes. In the same year his tragedy of Irene was produced at Drury Lane Theatre, under the auspices of Garrick. It was performed thirteen nights with but moderate applause, and Johnson, satisfied that he was not formed to excel in the drama, wisely gave up the endeavour. In March, 1750, appeared the first paper of the Rambler, the gravity of the tone of which, notwithstanding its acuteness of observation, richness of illustration, and dignity of expression, prevented it from obtaining a wide circulation as a periodical paper, although, when collected into volumes, the author himself lived to see it reach a tenth edition. A short time before the appearance of the Rambler, half deluded by his political dislike of Milton, he hastily adopted the imposture of Lauder, in his attempt to fix the charge of plagiarism on that great poet. When undeceived, however, he insisted upon Lauder's signing a formal recantation, and, possibly as some atonement, wrote a prologue to Comus, when acted for the benefit of Milton's grand-daughter. In the year 1755 was published his long-expected Dictionary, to which his name appeared with the degree of M.A., obtained from the University of Oxford, by the good offices of Mr. Warton. The approaching publication of this work Lord Chesterfield had favourably announced, some months before, in two papers of the World; but Johnson, conscious of having received no sort of support or encouragement from that nobleman during its progress, addressed to him a well-known letter, replete with pointed sarcasm and manly disdain. The Dictionary was received by the public with very general applause; and although its neglect of the northern etymologies, and the defects rendered apparent by more recent research, have somewhat lessened its original reputation, it still remains the basis of works of the kind in the English language. In its progress, however, this great work had done nothing beyond merely supporting him; and it appears, from an arrest for a very trifling sum, in the year subsequent to its publication, that his necessities continued undiminished. An edition of Shakspere, the Idler, with occasional contributions for a literary magazine, formed the desultory occupation of several succeeding years. In 1759 he wrote his celebrated romance of Rasselas, Prince of Abyssinia, which fine performance he composed in the evenings of one week, in order to defray the funeral expenses of his aged mother. At length, in 1762, the Bute administration granted him a pension of £300 per annum, which he accepted, after a short struggle against the reception of a favour from the house of Hanover. His own sarcastic definition of the word *pensioner*, in the Dictionary, was naturally enough quoted upon this occasion; but the sterling and acknowledged merits of the man formed a satisfactory apology. His advanced reputation and amended circumstances now considerably enlarged his acquaintance, and he became member of a weekly club in Gerrard Street, Soho, composed of the most eminent men of talents of the day—Goldsmith, Burke, Garrick, Sir Joshua Reynolds, &c. In the following year (16th May), in spite of his well-known inveterate prejudice against the Scotch, the first interview with his now equally famous biographer, James Boswell, was effected in the back parlour of Tom Davies, actor and bookseller. The acquaintance then commenced was sedulously cultivated by Boswell, and for more than twenty years the worship of his great friend was the grand, ideal, voluntary business of his life. In 1765 commenced that intercourse with the Thrale family which produced Johnson so much social enjoyment, and in the same year appeared his long-promised edition of Shakspere, which was ushered in by an admirable preface; but the work itself did not altogether answer public expectation, owing principally to the superficial acquaintance of the commentator with the writings of the age in which Shakspere flourished. In 1770, although his pension was given without conditions, his attachment to the monarchical side in general politics led him to compose a pamphlet, entitled the False Alarm, in favour of the resolution of the House of Commons in the affair of Wilkes—that expulsion implied incapacity of re-election. This production was followed by Thoughts on the Late Transactions in Falkland's Island, against the conduct of Spain in regard to that unprofitable possession; the Patriot, written on the era of the general election, in 1774; and Taxation no Tyranny, a more considerable effort, which made its appearance in 1775, against the arguments of the American colonists relative to the power claimed by the mother country to tax them at pleasure. In 1773 he made a tour to the Hebrides, in company with his friend Boswell, of which he gives a highly instructive account in his Journey to the Western Isles of Scotland. In this production he pronounced decidedly against the authenticity of Ossian, which sentence involved him in a broil with Macpherson. In 1775 he received the diploma of D.C.L. from the University of Oxford, and soon after visited France, in company with the Thrales

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and Baretti. His last literary undertaking was his Lives of the Poets, which was completed in 1781; they were written to prefix to an edition of the works of the principal English poets, and, in a separate form, comprise four volumes, 8vo. With an occasional exhibition of political bias and strong prejudices, a conspicuous instance of which is supplied by the life of Milton, they form a valuable addition to English biography and criticism. The concluding portion of the life of this eminent man was saddened by the loss of many old friends, and by declining health. In 1783 he was greatly alarmed by a paralytic stroke, and his health never wholly recovered the shock, although he lived to the 13th December, 1784. For some days previously he retained all his horror of dissolution; but he finally died with devotional composure. This event took place in his seventy-fifth year, and his remains were interred in Westminster Abbey, with great solemnity. His statue has been placed in St. Paul's.

From the numerous and copious biographical tributes to the memory of Dr. Johnson, and especially that of Boswell, few persons have been made so well known to the public, either as authors or men. In the former capacity he is more to be admired for vigour and strength than for novelty of conception. No writer delivers moral maxims and dictatorial sentences with more force, or lays down definitions with more grave precision. He also excels in giving point to sarcasm, and magnificence to imagery and abstraction. His critical acumen, setting aside personal and political prejudices, was likewise very great; but he is utterly averse to the easy and familiar, both in his style and sentiment, the former of which made an era in English composition. His style is marked by an exuberance of words of Latin etymology, and though its sonorous rotundity of phrase has betrayed some able writers into injudicious imitation, the admiration in which it was formerly held has now long subsided.

As a man Dr. Johnson was, in mind as in person, powerful and rugged, but he was capable of acts of benevolence and of substantial generosity which do honour to human nature. His strong prejudices have been already mentioned, and it is to be regretted that his admirable conversational and argumentative powers were sullied by dictatorial arrogance and the most offensive impatience of contradiction—qualities that were unhappily heightened by the extreme deference and lavish admiration with which he was treated on arriving at the summit of his reputation. The effect was more injurious to himself than his hearers, as it evidently fostered the seeds of bigotry and intolerance with which he set out in life. Upon the whole, however, both the moral and intellectual character of Dr. Johnson stands very high, and he may be regarded without hesitation as one of the most eminent of the distinguished writers of the eighteenth century. His works were published collectively in eleven vols., with a life of the author, by Sir John Hawkins (1787), and in twelve vols. by Murphy in 1792. See his life by Boswell, Hawkins, Murphy, &c.

JOHNSTON, Alexander Keith, one of the most eminent modern geographers, was born at Kirkhill, near Edinburgh, 28th December, 1804, and was educated at the high school of that city. He was intended for the medical profession, but after a time gave up his studies in that direction, and learned the art of engraving. He seems to have been early dissatisfied with the inaccuracies and imperfections of the maps published in this country, and desirous of rivalling the productions of the best continental cartographers. His first important work, the National Atlas, was published in 1843, after five years' incessant labour. Most of the maps were projected and drawn by himself, and nearly all the names written with his own hand. This work went through many editions, and procured for its author the appointment of geographer royal for Scotland. His next great work was the Atlas of Physical Geography, published in 1848. It was at first intended to be founded on the excellent atlas by Berghaus, but as it proceeded this intention was abandoned, and the Physical Atlas became essentially an original work. He received great assistance and encouragement from Karl Ritter, Humboldt, Berghaus, and the Royal Geographical Society. On the appearance of the Atlas, which is characterized in the Bulletin of the Geographical Society of Paris as one of the most magnificent monuments yet raised to the scientific genius of our century, he was elected a fellow of the leading geographical societies of Europe, America, and India. In 1865 the University of Edinburgh conferred upon him the honorary degree of LL.D. He died at Ben Rhydding in Yorkshire, 9th July, 1871. Among his minor publications are an Atlas of the Historical Geography of Europe; a Dictionary of Geography (better known as Johnston's Gazetteer); an Atlas of Astronomy, in conjunction with Mr. Hind; a Geological Map of Europe, with Sir R. J. Murchison and Professor Nicol as coadjutors; numerous educational works on physical, classical, and general geography, all of which have seen several editions. Dr. Johnston also constructed the first physical globe ever drawn, which was exhibited in the International Exhibition of 1851, and for which he received the medal.

JOHNSTON, James F. W., a distinguished chemist, was a native of Paisley, and born there in 1796. His education was in a great measure due to his own exertions, and for a while he gained his livelihood by giving private instruction to students attending Glasgow College. In 1825 he opened a school at Durham, and five years subsequently bettered his fortunes so considerably by marriage that he resolved to devote himself to the study of chemistry. He accordingly proceeded to Stockholm, attended there the instructions of Berzelius, and in a short time made himself so proficient a chemist that, on the establishment of the University of Durham, he was appointed reader in chemistry and mineralogy. He more especially directed his attention to the relations between chemistry and agriculture; and his Catechism and Lectures on Agricultural Chemistry and Geology attained great success, the former work going through upwards of thirty editions in his lifetime. Another celebrated, and perhaps the most popular of all his works, is his Chemistry of Common Life, a series of papers on food and drink and similar subjects, originally contributed to Blackwood's Magazine, and afterwards published separately. The soundness of some of the statements made by him may be questionable, but the attractive manner in which the subjects are treated rendered the series extremely popular, and there can be no doubt of their containing a vast amount of useful information. Professor Johnston is also the author of Notes on North America, an account of a tour in the New World. While travelling on the Continent in the summer of 1853 he was suddenly seized with a spitting of blood, terminating in a rapid decline, which carried him off on 18th September.

JOHNSTONE, a thriving town in Renfrewshire, in the *quoad sacra* parish of Johnstone, which was disjoined from the Abbey parish of Paisley in 1835. Previous to 1781 the town, which lies about 4 miles west from Paisley, consisted only of one or two cottages built near the bridge over the Black Cart

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River. It is now a considerable and flourishing town, with a population in 1881 of 9267. It owes its prosperity to the introduction of cotton-spinning, but this industry is not now carried on here so extensively as it was, there being only three cotton-mills. There are, however, large flax-mills, giving employment to over 2000 hands. There are also several machine manufactories, and brass and iron foundries, the engineering industries being carried on on a large scale. It is also a station on the Glasgow and Ayr section of the Glasgow and South-Western Railway.

JOHNSTONE, MRS., an authoress of some merit, was a native of the parish of Dollar in Clackmannanshire, but of her early life little is known. Her maiden name was Christian Tod, and she was chiefly indebted to her own exertions for the cultivation of her mind and the acquisition of information. She married Mr. Johnstone, a gentleman of considerable literary attainments, who conducted for many years with great success a school in Dunfermline. One of her first efforts was Clan-Albyn, a National Tale, which obtained considerable popularity at the time. Other works of fiction by her were Elizabeth de Bruce, Nights of the Round Table, and tales innumerable, contributed many of them to Tait's Magazine. Of this last periodical she acted as editress for many years, and conducted also for some time the Inverness Courier. Another highly-successful work of hers was Meg Dods' Cookery Book, a most ingenious combination of humorous description and gastronomic science. Perhaps one of her raciest productions, however, is her Mrs. Mark Luke, or West Country Exclusives, a pungent satire on the anomalies of social caste as exemplified in Glasgow about forty years ago. Mrs. Johnstone was a lady of a most amiable and beneficent disposition, and particularly delighted in the society of children. She died in Edinburgh at an advanced age on 26th Aug. 1857.

JOINERY. See CARPENTRY.

JOINT-STOCK COMPANIES, a species of partnership in which a number of persons contribute funds or *stock* for the purpose of carrying on a trade or other profitable object. In an ordinary partnership the members bring more or less of their personal management into the affairs of the company, and although in peculiar circumstances a partner may abstain from any interference, such a person, called in trading language a *sleeping partner*, is treated by the law in all respects as if he participated in the responsibilities and privileges of his working brethren. The distinctive peculiarity of the joint-stock company is, that the members throw their stock into the venture without directly participating in the management, which may be in the hands of the shareholders or in those of persons who do not contribute at all to the undertaking. The capital is generally divided into equal shares, each member holding one or more, and in proportion to the number participates in the profits. After the stock of a company of this sort has been fully subscribed no one can enter it without previously purchasing one or more shares from some of the existing members. No member can demand payment of his share from the company, but he may, without consent of his fellow-members, transfer his share to another person. If the company is believed to be in a prosperous condition the shares may be sold for a much larger sum than the owner stands credited for in the stock of the company. Originally joint-stock companies were formed by an instrument called a *deed of settlement*, by which the constitution of the company and the conduct of its affairs were regulated. The courts of law and equity considered companies so formed as ordinary partnerships, and the rights and liabilities of the members among themselves were determined upon the principles applicable to an ordinary partnership. But this led to inconvenience. It was impossible for one partner to maintain an action against a copartner, so that the directors could not sue the shareholders for calls, and the whole affairs of the company had to be thrown into chancery before a call could be recovered. Besides, courts of equity declined to entertain suits for settling disputes between members unless the company consented to a dissolution, and this was rendered impracticable by the necessity of making all the members parties to it. Again, no action lay against a debtor of the company unless all the shareholders were plaintiffs. Various remedies for these evils were attempted from time to time, as for instance by act 1 Vict. cap. lxiii., by which the queen was empowered to grant, by letters patent, to persons associated for trading and other purposes many of the privileges of a charter of incorporation, by limiting the liability of the patentees, and enabling their secretary or other officer to prosecute or defend in the name of the association, and even sue one of their own members. In the present reign numerous other statutes were passed to regulate the constitution and the proceedings of such companies, which were in 1862 all repealed, and replaced by one consolidated statute called the Companies' Act, 25 and 26 Vict. cap. lxxxix., which, taken along with the common law, constitutes the code of joint-stock companies now applicable to the United Kingdom. Under this statute insurance and all other companies are included. Petitions to wind up companies must be presented to the Court of Chancery, and may be by that court referred to the Court of Bankruptcy. Seven or more persons associated for any lawful purpose may, by subscribing their names to a memorandum of association, form an incorporated company, with or without limited liability. The distinction between limited and unlimited liability companies is, that if an unlimited company contract any debts, no matter how large, every member is liable, if his fellow-members turn out unable to bear their proportions, to pay the whole of these debts to the extent of his fortune, a result which has frequently been ruinous to the richer members; whereas if the company is limited, each member can in no event be called upon to pay more than he expressly guaranteed. A company may be registered in one of three forms: 1, as a company limited by shares, where the liability of each member is limited to the amount unpaid on the shares; 2, as a company limited by guarantee, where the liability of each member is limited to such amount as he undertakes in the memorandum of association to contribute to the assets of the company if it should be wound up; and 3, an unlimited company, where there is no limit to the liability of the members. In the first two cases the word 'limited' must be added to the name of the company, and the amount of capital, object, place of business, and declaration of the limit or the amount of guarantee must be entered in the memorandum of association, which must be accompanied by articles of association providing for the internal management of the company. An annual list of members must be forwarded to the registrar of joint-stock companies, an official appointed by the board of trade; and there must be at least one office for registration in each of the three kingdoms. This annual list is to be open to inspection. A general meeting of the company must be held at least once a year. No company is to carry on business when the number of members is less than seven. Some companies, such as insurance, limited banking, deposit, provident, or benefit societies, must each year

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make out and suspend in their offices a statement of their debts and assets. For a falsification of books or accounts an imprisonment of two years with hard labour is provided. The court has power to assess damages against delinquent directors and other officers for any breach of trust or misapplication of the funds; and notwithstanding the offence is one for which the offender is criminally liable, he may be ordered to pay a sum towards the assets of the company by way of compensation for his misconduct. A company may be wound up whenever it passes a special resolution to that effect; also whenever it does not commence business within a twelvemonth after incorporation, or if it suspends its business for a whole year; also whenever its members are reduced to less than seven; whenever it is unable to pay its debts; and lastly, whenever the court thinks it just and equitable that it should be wound up.

Joint-stock companies are of comparatively modern origin, and they can exist with a chance of success only in communities of good business notions and habits, where there is an intelligent spirit of enterprise, and that degree of mutual confidence which can give stability to the undertaking. We find accordingly that Britain has taken the lead in associations of this nature, which have now, however, attained a considerable development in the Netherlands and the United States. In several of the American states there are no such associations as joint-stock companies, as distinguished from corporations, but provision has been legally made for the establishment of companies of a like nature, by modifying the general principles relating to corporations in regard to the personal liabilities of the members. It should be always borne in mind that scrupulous care is necessary in making investments in joint-stock shares, as it too frequently happens that in periods of ease in the money market scheming speculators devise projects of this kind, and by holding out specious views of immense profits, induce unwary capitalists to take shares; the result is a collapse of the company, and loss to all concerned, except the projectors. An individual who manages his own business reaps all the advantage derivable from skill, industry, and economy; but the agents, and even directors of joint-stock companies labour in most cases directly for the interests of others, and have not the same powerful motives to act with energy, economy, and caution. Hence the different success of associations whose affairs can be managed on a nearly uniform plan, such as dock, gas, water, railway, banking and assurance companies, and those whose business does not admit of being reduced to a regular plan, and where much must be left to the discretion of the staff of the company. All purely trading joint-stock associations are of this latter class, and are generally unable to compete with the establishments of private adventurers. They cannot subject their agents to any effectual responsibility; the shareholders themselves often act with reckless imprudence, asking no questions as long as they receive satisfactory dividends, an indifference which leads at times to disastrous results.

JOINT TENANTS are those that hold lands or tenements, or other property, as goods and chattels, by one title, without partition. The creation of an estate in joint tenancy depends on the wording of the deed or devise by which the tenant claims title, and cannot arise by act of law. If any estate be given to a plurality of persons without adding any restrictive, exclusive, or explanatory words, this makes them immediately joint tenants in fee of the lands. If there be two joint tenants, and one release the other, this passes a fee without the word *heirs*. Joint tenants may make partition. The one party may compel the other to make partition, which must be by deed; that is to say, all the parties must by deed actually convey and assure to each other the several estates which they are to take and enjoy severally and separately. Joint tenants must jointly implead and be jointly impleaded with others. If one joint tenant refuse to join in an action he may be summoned and severed; but if the person severed die the writ abates in real actions, but not in personal and mixed actions. In a joint tenancy the last survivor takes the whole, as if the estate had been given to him only, unless any of his companions have conveyed away their shares by deed. In the United States the law is substantially the same as in England, but it has been the policy of the American legislature to convert estates, which in England would by legal construction be deemed joint tenancies, into tenancies in common.

JOINTURE, in English law, a provision for the wife, to take effect in profit or possession on the husband's death. If a jointure be made to a woman after marriage she may after the husband's death either accept it or claim her dower at common law, as she was not capable of consenting to it during coverture. A jointure is not forfeited by the adultery of the wife as dower is. If it be created out of the estate before marriage the husband cannot sell the estate to defeat the jointure. The jointure must continue for the wife's life at least, and must be given to the wife herself, not merely to trustees for her; and it must be expressed to be made in satisfaction of her whole dower. In Scotch law the word jointure is also used to signify a provision made to a widow, consisting either of an annuity, or of a life-rent assignation of rents, or of a life-rent of lands. In American law, while the main features of the English law are retained, in many of the states it has been frequently modified by statute. The statutes of the several states must be specially consulted on this subject, as they differ in some important respects.

JOINVILLE, JEAN, SIEUR DE, one of the first important historians of the French, was born about 1223, of one of the oldest families of Champagne, and early entered the service of Thibaut, king of Navarre. He afterwards resolved to accompany Louis IX. on his crusade; and after pledging his estates to meet the expenses of the expedition raised a troop of nine knights and 700 armed soldiers, and took shipping with that monarch at Marseilles (1248). After arriving at the Isle of Cyprus, finding he had not the means of paying his troop, he offered himself and it to the king, and was accepted. He rose high in favour with Louis, shared his captivity, returned with him to France in 1254, and spent much of his time at court. He was, however, very averse to undertake a second crusade; and when Louis undertook it in 1269 he excused himself from attending him on the ground that he had been ruined by the first. His Histoire de St. Louis, which is one of the most valuable literary productions of the middle ages, has been often reprinted. He died about 1318.

JOLIBA. See NIGER.

JOLLY-BOAT. See BOAT.

JOMELLI, NICCOLO, a musical composer, born 1714 at Avellino or Aversa, in Naples. He first studied at Naples, under Feo, and afterwards under Martini at Bologna. At first he composed ballets—a sort of music then so little esteemed in Italy that he did not own himself the author of his first comic opera (L'Errore Amoroso), but gave it to the world under the name of Valentino, a master of not much reputation. This opera, which he composed at the age of twenty-three for the new theatre at Naples, was crowned with great applause, by which he was

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encouraged to continue his compositions. In 1738 he wrote his Odoardo, for the theatre of Florence, with still greater success, which induced him in 1740 to go to Rome. He now wrote, from 1740 to 1748, fourteen operas for Rome, of which the Astianatte, Ifigenia, and Caio Mario are particularly worthy of mention, in the latter of which the beautiful air Sposo, io vado a morir was received with the highest admiration. Besides these he composed several operas for Venice and other cities. He now received the place of chapel-master in St. Peter's, and composed, besides several motettes, the psalm Benedictus Dominus Deus Israel, the music of which is a master-piece. The Duke of Würtemberg then engaged him in his service, and Jomelli went to Stuttgart, where he remained from 1748 to 1765, enjoying the highest distinction, and exercising great influence on German music. When he returned to Italy John V., king of Portugal, invited him to his court. Although he declined this invitation he composed a considerable number of operas for the king, and sent him copies of all his subsequent works. He afterwards composed two operas in Rome, both of which were unsuccessful. He then removed to Naples, where he met with no better success; and August 28, 1774, he died of apoplexy, produced, as is supposed, by chagrin at the ill reception of his own operas. His Requiem and Miserere are particularly celebrated.

JOMINI, Henry, Baron, a distinguished soldier and military historian, was born at Payerne, canton of Vaud, Switzerland, March, 1779. He first served in the troops of his own country, but on the subjugation of Switzerland by Menard and Brune he went to Paris, and after having given a few years to commercial pursuits joined the French army with the rank of major in 1804, and was soon promoted to a colonelcy. He accompanied Marshal Ney to Germany in 1805–7 and to Spain in 1808 in the capacity first of aide-de-camp, then of chief staff-officer. Meanwhile he employed his pen in several political and military essays: as early as 1805 he had presented to Napoleon the first edition of one of his chief works, Traité des grandes opérations militaires, &c., in which the wars of Frederick the Great are described and compared with those of the revolution. Some misunderstanding having arisen between him and his commander he was dismissed from his post. He wished to enter the Russian service, but Napoleon would not allow him to throw off his allegiance. He was offered the alternatives of imprisonment or the rank of general, and accepted reluctantly the latter. In 1812 he was appointed governor of Wilna, and subsequently of Smolensk, and was of great service to the French army in the latter part of its disastrous retreat from Moscow. After the battle of Lützen in 1813 he resumed his duties as chief staff-officer of Ney, and so distinguished himself at the battle of Bautzen that his commander asked for him the grade of general of division. Not only was this recommendation overlooked by Berthier, who was unfriendly to him, but his name was struck out of the promotion list, and he was arrested on some trivial charge. This he deeply resented; and after the armistice of Pläswitz he repaired to the head-quarters of the Russian emperor, who at once appointed him his aide-de-camp. He declined taking any active part in the operations of the allies against France. In 1815 he accompanied the emperor to Paris, and tried, but in vain, to save Ney's life. He served in the war against Turkey (1828), and in 1830 organized the Russian military academy. He then retired to Brussels, but hastened to St. Petersburg on the outbreak of the Crimean war. He took no active part in the struggle, and soon returned to Brussels. He died at Passy in 1869. Some of his most important works are Principes de la Stratégie (three vols. 8vo, Paris, 1818); Vie politique et militaire de Napoléon (four vols. 8vo, Paris, 1827); Précis de l'art de Guerre (fifth edition, Paris, 1838); &c.

JONAH (Hebrew, signifying *dove*), one of the minor prophets, son of Amittai, and according to 2 Kings xiv. 25 a contemporary of Jeroboam II., was born at Gath-Hepher, in Galilee. In the book which bears his name it is related that he received a command from God to go and prophesy against Nineveh; but he fled to Joppa, and embarked for Tarshish, either Tartessus in Spain, or more probably Tarsus in Cilicia. The vessel being tossed by a storm it was concluded to draw lots in order to determine who was the cause of the tempest. The lot fell upon Jonah, who was thrown overboard by his own request because he had been disobedient to God, but was swallowed by a large fish (according to the ancient commentators a whale, according to moderns a shark). After he had remained three days and nights in the belly of the fish the Lord spake unto the fish, and it vomited out Jonah on dry land. He now went to Nineveh, and prophesied its destruction; but the king and people having repented Nineveh was spared. Jonah, angry at this, went out of the city, and God made a gourd grow up over him, which was a shade to him. He then sent a worm, which smote the gourd so that it died in one night. Jonah was angry at this also; but God showed him the foolishness of being angry at the destruction of a gourd and yet demanding the destruction of a city in which were 120,000 innocent children. Jonah's grave is shown at Mosul, the ancient Nineveh, and also at Gath. Some critics maintain that the book was not written by Jonah himself, but is a collection of traditions made after the destruction of Nineveh. Some rationalists consider it merely as an allegorical poem. The story of Jonah is also known to the Mohammedans, according to whom he embarked after his prophecy at Nineveh and remained forty days in the belly of the fish. The prayer of the prophet in this situation is considered one of the most efficacious in the Koran.

JONAS, Justus, one of the most active promoters of the Reformation, was born in 1493 at Nordhausen, in Thuringia, became in 1521 professor of theology and provost at Wittemberg, and distinguished himself by his exertions in the removal of abuses. He accompanied Luther to the diet at Worms, assisted him in translating the Old Testament, took part in the Marburg Conference as well as in drawing up the so-called articles of Torgau, and was present at the Diet of Augsburg. He likewise did good service by his own writings, and the translation of those of others, more especially by publishing several of Luther's productions and Melanchthon's Apology for the Augsburg Confession in German. He was afterwards superintendent, first in Halle and afterwards in Coburg. The latter situation he held till his death at Eisfeld in 1555.

JONATHAN, or Brother Jonathan, the nickname given to the Americans of the United States collectively by the British, probably on account of the frequency of this name among the early Americans.

JONES, Inigo, the reviver of classical architecture in England in the beginning of the seventeenth century. He was a native of London, where his father was a cloth-worker, and was born about 1572. Destined for a mechanical employment, his talents attracted the notice of the Earl of Arundel and of William, earl of Pembroke, the latter of whom supplied him with the means of visiting Italy for the purpose of studying landscape-painting. He went

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to Venice, where the works of Palladio inspired him with a taste for the art of architecture, in which he rose to great eminence. His reputation procured him the post of first architect to Christian IV., king of Denmark, who, visiting his brother-in-law, James I., in 1606, brought Jones with him to England. He was induced to remain, and was appointed architect to the queen, and subsequently to Henry, prince of Wales. After the death of the prince he again visited Italy, and remained there some years. During this interval he extended his knowledge and improved his taste from the examination of the models of ancient and modern art. The banqueting house at Whitehall (intended as an adjunct to a magnificent palace) is a monument of his skill and science. At Winchester Cathedral, a Gothic building, he erected a screen in the style of classic antiquity. Like his successor Wren he seems not to have duly appreciated the peculiar character and distinctive beauties of the pointed style of building, of which so many fine specimens remain in the ecclesiastical structures of the middle ages in Britain, France, and Germany. He built the front of Wilton House, in Wiltshire, for Philip, earl of Pembroke, and was much employed by the court and by many of the nobility and gentry, so that he realized a handsome fortune. His talents were often put in requisition for the purpose of designing the scenery and decorations for masks—a species of dramatic entertainment fashionable in the early part of the seventeenth century. In these pieces the dialogues and songs were composed by Ben Jonson, who quarrelled with Jones, and abused him in epigrams and satires. The enmity of the poet was not the only misfortune to which the architect was exposed. Being a Roman Catholic, and a partisan of royalty, he suffered in the civil war, and in 1646 was forced to pay a fine of £545 as a malignant or cavalier. The ruin of the royal cause and the death of the king distressed him greatly; and at length, worn down by sorrow and suffering, he died, June 21, 1652. As an author he is known by a work relative to that curious monument of former ages, Stonehenge, on Salisbury Plain, published after his death by his son-in-law, Mr. Webb. The object of this treatise, composed by the command of King James I., is to prove that Stonehenge was erected by the Romans, and was a hypæthral temple dedicated to the god Cœlus. A collection of the architectural designs of Inigo Jones was published by Kent in 1727 and 1744, and others more recently by Ware and by Leoni.

JONES, JOHN PAUL, a commander in the American naval service, was born at Arbigland, Kirkcudbright, in Scotland, July 6, 1747. His father, whose name was John Paul, was gardener to the Earl of Selkirk. At the age of twelve he was bound apprentice to a merchant of Whitehaven, in the American trade. His first voyage was to Virginia, where his elder brother was established as a planter. He was then engaged for some time in the slave-trade, but quitted it in disgust, and returned to Scotland in 1768. Jones was afterwards in command of the *Betsy*, of London, and remained some time in the West Indies, engaged in commercial pursuits and speculations, by which it is said he realized a handsome fortune. In 1773 he was residing in Virginia, arranging the affairs of his brother, who had died intestate and childless, and about this time took the name of Jones. On the commencement of the struggle between the colonies and mother country he offered his services to the former, and was appointed first lieutenant to the *Alfred*, and soon after to the command of the *Providence*, mounting twelve four-pounders, with a complement of seventy men, in which, cruising from the Bermudas to the Gut of Canso, he made sixteen prizes in little more than six weeks. In May, 1777, he went to France, where the American commissioners, Franklin, Deane, and Lee, appointed him to the command of the *Ranger*, with discretion to cruise where he pleased. With this single ship he set sail 10th April, 1778, and kept the whole coast of Scotland, and part of that of England, for some time in a state of alarm, and made a descent at Whitehaven, where he surprised and took two forts, with thirty pieces of cannon, and set fire to the shipping. In this attack the house of the Earl of Selkirk was plundered, and the family plate carried off, but was afterwards restored by Jones. He set out from St. Croix on a second cruise with a squadron of seven sail. The principal occurrence of this cruise was the capture of the British ship of war *Serapis*, after a bloody and desperate engagement off Flamborough Head, September 23, 1779. The sensation produced by this victory was unexampled, and his reception at Paris, whither he went on the invitation of Franklin, was of the most flattering kind. The king presented him with a gold sword, and invested him with the military order of merit. On his return to America in 1781 Congress highly complimented him for his zeal, prudence, and intrepidity, and voted him a gold medal. He subsequently went on board the French fleet, where he remained until the conclusion of peace. He then went to Paris as agent for prize-money, and while there joined in a plan to establish a fur trade between the north-west coast of America and China, in conjunction with John Ledyard. He afterwards was invited into the Russian service, with the rank of rear-admiral, but owing to a quarrel with the admiral (the Prince of Nassau) and intrigues at court, soon retired from the service, being promised a pension, which was never paid. He returned to Paris, where he gradually sunk into poverty, neglect, and ill health, until his death, July 18, 1792.

JONES, OWEN, a distinguished artist and architect, was born in Wales in 1809, and showing an early inclination for art, was articled to Lewis Vulliamy, a well-known architect and ornamentist. After having studied for some time under this artist Jones set out upon a tour which lasted nearly four years, and which was extended to Turkey and Egypt. In 1834 we find him at Granada in company with Jules Goury, an able French student in his own line. They commenced collecting the material for the work on the Alhambra, which has since become universally famous. Goury having died, the publication was undertaken by Jones, who devoted himself entirely to the task, not only of drawing the details, &c., but of printing in colours and gold the plates when they were prepared. The work, under the title of Plans, Sections and Details of the Alhambra, appeared in parts, the issue of which began in 1836, and was completed in 1845, and included a historical notice by Pascual de Gayangos, an accomplished scholar and antiquary. In 1842 Jones published his Designs for Mosaic and Tesselated Pavements, and in 1846 the Polychromatic Ornament of Italy, comprising examples of frescoes and decorative works of the sixteenth century. He had previously prepared a plan for the decoration of the pavements of the Houses of Parliament, which attracted much attention at the time. He was appointed a superintendent of the works for the Great Exhibition of 1851, and took an active part in the decoration and arrangement of the building. The principles of decorative design associated with his name were first comprehensively set forth in his essay, An Attempt to Define the Principles which Regulate the Employment of Colour in Decorative Arts, and subsequently in lectures delivered before the public at various places. In 1852 he was appointed director

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for the decoration of the Sydenham Crystal Palace, and visited most of the prominent examples of ancient decoration which exist on the Continent in order to collect the series of casts and other works of art now exhibited in that palace. He designed the decorations for the Egyptian, Greek and Roman, and Alhambra Courts, and superintended the decoration of the whole building. In 1856 his Grammar of Ornament was published, and it still remains a text-book of examples, if not of principles. In 1864 appeared 1001 Initial Letters, and the same year 704 Monograms. His last important work was his Examples of Chinese Ornament (1867). Besides these publications he made a considerable number of ornamental designs for many new works published by Longmans and Co., and others. He died in London, 19th April, 1874.

JONES, Sir William, an eminent lawyer and accomplished scholar, was born in London, September 20, 1746. He lost his father when only three years of age, and the care of his education fell on his mother, a lady of uncommon endowments. At the close of his seventh year he was placed at Harrow, and in 1764 he entered University College, Oxford. He accepted, in 1765, the office of tutor to Lord Althorp, afterwards Earl Spencer; and some time after, he obtained a fellowship also. This tutorship he held until 1770, when he entered himself as a law student in the Temple. Previously to this time he had made two tours on the Continent, and had translated into French a Persian life of Nadir Shah. On the appearance of the life and works of Zoroaster, by Anquetil du Perron, he vindicated the University of Oxford, which had been attacked by that writer, in an able pamphlet in the French language, which he wrote with great elegance. In 1771 he published an excellent grammar of the Persian language, a ninth edition of which, revised by Professor Lee, appeared in 1828. He also published, in 1772, a small collection of poems, chiefly from the poets of Asia, and was the same year elected a fellow of the Royal Society. In 1774 appeared his work Poeseos Asiaticæ Commentariorum, Libri Sex, containing commentaries on Asiatic poetry in general, with metrical specimens in Latin and English. He was soon after called to the bar, and in 1776 made a commissioner of bankrupts. In 1778 appeared his translation of the Orations of Isæus, with a prefatory discourse, notes, and commentary. He rapidly advanced in professional reputation, although his condemnation of the war with America stood in the way of his progress to legal honours. The tumults of 1780 induced him to write a pamphlet on the Legal Mode of suppressing Riots; and in the following winter he completed a translation from the Arabic of seven poems, known as the Moallákat, or 'suspended,' from being hung up in the temple at Mecca. These pursuits did not prevent his writing an Essay on the Law of Bailments. In 1782 he drew up a Dialogue between a Farmer and a Country Gentleman on the Principles of Government; for the publication of which the Dean of St. Asaph, afterwards his brother-in-law, had a bill of indictment preferred against him for sedition. Upon this event he sent a letter to Lord Kenyon, then chief-justice of Chester, owning himself the author, and defending his positions. On the accession of the Shelburne administration, through the influence of Lord Ashburton, he obtained the appointment of judge in the supreme court of judicature, Bengal, to which he was nominated in March, 1783, and knighted. He arrived at Calcutta in September, 1783. Here he established the Royal Asiatic Society, for inquiring into the history and antiquities, the arts, sciences, and literature of Asia, and he was the first president of the society. He then applied himself with ardour to the study of the Sanskrit, and his health soon suffering from the climate he took a journey through the district of Benares, during which cessation of public duties he composed a tale in verse called the Enchanted Fruit, or the Hindu Wife, and a Treatise on the Gods of Greece, Italy, and India. In 1785 a periodical work, entitled the Asiatic Miscellany, was begun at Calcutta, to which he communicated several poetical compositions of the minor kind; among which were nine hymns, addressed to as many Hindu deities. He next employed his active mind in planning the compilation of a complete digest of the Hindu and Mohammedan laws, with a view to the better administration of justice among the natives. This work he did not live to finish, but its subsequent accomplishment was entirely owing to his recommendation and primary labours. His object in this instance was to secure a due attention to the rights of the natives; and he showed himself equally jealous of those of the British inhabitants, by opposing an attempt to supersede the trial by jury. The publication of the Asiatic Researches, or memoirs of the society to which he had given birth, also engrossed much of his attention; and he enriched them himself with a number of curious and interesting papers. In 1789 he gave to the world the translation of the ancient Indian drama by Kâlidâsa, entitled S'ákuntala. His translation of the Ordinances of Manu, the famous Indian legislator, appeared early in 1794, and is very interesting to the student of ancient manners and opinions. He was seized, in April, 1794, at Calcutta, with an inflammation of the liver, which terminated his life on the 27th of the same month, in the forty-eighth year of his age. Few men have died more respected and regretted than this amiable man and eminent scholar, who, as a linguist, was among the most eminent of his time. The directors of the East India Company voted him a monument in St. Paul's Cathedral, and a statue in Bengal. A splendid edition of his works, in six vols. 4to, 1799, was published by Lady Jones, who also placed a fine marble statue of him, executed by Flaxman, in the anti-chamber of University College, Oxford.

JONGLEURS. See Jugglers.

JÖNKÖPING, a town of Sweden, capital of the län of same name, at the southern extremity of Lake Wetter, on a tongue of land interposed between that lake and Lakes Rock and Munk, 83 miles E.N.E. of Gottenburg. It lies so low that part of it is protected by embankments from inundation. It is in general well built, having substantial-looking houses and wide streets; and contains a handsome church, governor's residence, town-house, theatre, and grammar-school. It also has manufactures of cards and tobacco; and a haven in the Munk Lake, at which the trade, formerly important, has been greatly increased by the completion of the Göta Canal. In the vicinity are the mineral springs of Lindal and Maredal. Pop. (1880), 16,147.

JONQUIL (French, *jonquille*), a bulbous plant of the genus *Narcissus* (*N. Jonquilla*), allied to the daffodil. It has long lily-like leaves, and spikes of yellow or white fragrant flowers. It is a native of the south of Europe, and one of the most common bulbous plants in our flower borders. The sweet-scented jonquil, likewise a native of southern Europe, is also generally cultivated. Perfumed waters are obtained from jonquil flowers.

JONSON, Ben, or Benjamin, a celebrated English poet, the contemporary and friend of Shakspere. He was, according to Drummond of Hawthornden, the posthumous son of a clergyman, who had suffered considerable privations for his religious opinions, and was born June 11, 1574, at Westminster, though

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another authority gives Warwickshire. He was placed at the Westminster grammar-school, under Camden, at an early age; till his mother being married again to a person who held the humble occupation of a bricklayer, young Ben, as he was familiarly called, was taken home abruptly by his step-father, and employed by him as an assist nt in his trade. The researches of P. Cunningham and J. Payne Collier throw, however, considerable doubt on his mother's second marriage, and on details of his own early biography. The ardent spirit of the future poet, it is said, revolted against his condition; he fled from home, and entered the army as a private soldier, in which capacity he served with much commendation from his officers on the score of personal courage during a campaign in Holland. Returning to England, he quitted the service, and although his straitened circumstances threw in his way obstacles of no common magnitude, he determined to apply himself to literary pursuits. With this view he contrived to enter himself of St. John's College, Cambridge; but his failing resources prohibited him from continuing long at the university. He went to London and commenced at once author and actor by profession—two callings then frequently combined. His progress as a performer was not rapid, and before he could make any great impression in his favour, he had the misfortune to kill a brother actor in a duel, for which he was imprisoned, and narrowly escaped with life. During his confinement he is reported to have become, through the intervention of a Roman Catholic priest, a convert to that communion, and to have remained so during a space of twelve years, when he resumed his former opinions. His first attempt at dramatic composition was in 1598, when his Every Man in his Humour, still considered a standard piece, was printed; and from this period he seems to have produced a play annually for several years, besides writing, occasionally, masks and interludes for the entertainment of the court. The favour he had enjoyed there was not, however, sufficient to protect him from the consequences of a severe and imprudent satire on the Scottish nation, in a dramatic piece, which he wrote in conjunction with Marston and Chapman, entitled Eastward Ho! The anger of the favourites of James I. was at once drawn upon his head by this unfortunate sally; he was a second time committed to prison, and only a timely submission saved his nose and ears, which he was condemned to lose in the pillory as a libeller. By his address, however, he soon contrived to reinstate himself in the favour of a monarch to whose pleasures the effusions of his muse had become necessary; and for the remainder of that reign he continued in high favour as a kind of superintendent of the court revels. After a tour through France, in 1613, in the progress of which, with his usual recklessness, he affronted Cardinal Du Perron, he returned to England, and afterwards obtained the honorary degree of A.M. from the University of Oxford. On the death of the poet laureate Jonson was appointed his successor, and the salary of 100 marks, attached to that post, was, on his petition, raised to the sum of £100 by Charles I. But neither this addition to his income, nor a subsequent gratuity from the same royal source, could save him from the consequences of pecuniary improvidence. Much of his time and money was spent at the Apollo and the Mermaid Taverns, feasting and being feasted by the gay literary circle of the time; drinking deep potations and engaging in many wit combats with Shakspere, whose brilliant and delicate wit was too much for the heavy saturnine humour of Jonson. An attack of palsy at length carried him off, Aug. 6, 1637. He was buried in Westminster Abbey, where a monument was erected to his memory bearing the inscription 'O rare Ben Jonson.' Jonson's best dramas are his Alchymist, Epicoene, and Volpone, which, besides being admirable as to plot and development, exhibit traits of pungent humour, strong conception, and powerful discrimination. The remainder of his dramas are inferior. His tragedies of Sejanus and Catiline are too learned and declamatory either for the closet or the stage, and a great portion of his comedy is low, forced, and unnatural. Contrary to Shakspere, he deals rather in passing manners and eccentricities than in general nature, but supplies a good notion of the follies of his times. His poetry is occasionally illuminated by vigorous and pleasing passages, and a few of his short pieces, poems, and especially the Hymn from Cynthia's Revels, his epitaph on the Countess of Pembroke, and some of his songs and Underwoods are excellent. Besides his dramatic and poetical productions, he was the author of a variety of miscellaneous works, among which are an English Grammar, Discoveries, &c. Several editions of his works have been published, the most complete of which is that by Mr. Gifford, in nine vols. 8vo; a later edition, edited by Barry Cornwall, was published by Moxon in one vol. royal 8vo (3d edit. 1853).

JOODPORE. See JODHPUR.

JOPPA. See JAFFA.

JORDAENS, JAKOB, an eminent historical and portrait painter, was born at Antwerp in 1594. He studied under his father-in-law, Van Oort, and then under Rubens. His pictures, which are numerous, and to be found in most European collections, are executed with correctness and brilliancy, but want taste and elegance of design. He died in 1678.

JORDAN (Hebrew, *Hay-Yarden*, Arabic, *Sheriat-el-Kebir*), a river of Turkey-in-Asia, in the pashalic of Damascus, and from the frequency with which it is mentioned in Sacred Scripture as the scene of numerous remarkable events in the history of the Jews, one of the most celebrated rivers in the world. It rises from several sources on the southern declivity of Mount Libanus and on Mount Hermon, uniting in Bahr el-Hûleh, or the waters of Merom. From this point it flows at first with a rapid current in a narrow bed, about 80 feet broad and 4 feet deep, but subsequently it becomes more sluggish; about 2½ miles below El-Hûleh it is crossed by a bridge, called Jisio Benát Yakôb (Bridge of the Daughters of Jacob), of Saracenic construction, built after the Crusades, probably in connection with the caravan route from Egypt to Damascus. After a southerly course of about 10 miles it expands into Lake Tiberias. Shortly after leaving the south end of this lake it receives the Yarmak on the left, and enters a broad valley or *ghor*, called in the Bible 'the plain;' and continuing a southerly but singularly crooked course of about 70 miles direct distance, or 200 including windings, falls into the north end of the Dead Sea, having received the Zerka, also on the left, and numerous smaller affluents. The upper part of the valley of the Jordan is hilly, arid, and barren, but it soon becomes more level and fertile; and as it approaches the Zerka it becomes well cultivated and beautiful. Excepting in the upper part it is populous. The river is muddy and full of small fish. In the dry season it is shallow, numerous places occurring where it may be crossed on the stones without the feet being wet; but in some places it is much deeper, with banks 20 feet high. At its mouth it is about 180 yards broad and about 3 feet deep. It is subject to great inundations during the winter season. It is crossed by numerous weirs, which divert the water for the purposes of irrigation; and its course is interspersed with many islands, and encumbered by twenty-seven threatening, besides many lesser rapids. It is a dark-coloured, rapid

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stream (varying from 2 to 8 miles an hour). The valley of the Jordan forms one of the most remarkable depressions in the world, being wholly below the level of the sea. The Lake of Tiberias, at its north end, is 328 feet, and the Dead Sea, at its other end, is 1312 feet below sea-level. The Jordan was crossed over against Jericho by the Israelites under Joshua, as the first step to the occupation of the promised land, when the waters were stayed in their course, and the tribes passed over dry-shod. Near this place John the Baptist commenced his ministrations; and it is supposed that it was at a ford some way above the junction of the Zerka that our Lord was baptized.

JORNANDES (properly *Jordanes*), by birth an Alan, or both of Alan and Gothic descent, lived under the Emperor Justinian, was at first a notary, but afterwards took the monastic vows, and is said to have been appointed bishop of some Italian city, probably Ravenna or Croton. His De Getarum Origine et Rebus Gestis, and his chronicle De Regnorum et Temporum Successione, are of much value, though written in barbarous Latin, and often inaccurate as to dates, places, and persons. The first work is a short compendium of the most important events in history from the creation down to the year 552 A.D., copied partly from the Epitome of Florus; the second is a much more important work, is confessedly an abridgment of Cassiodorus. They are contained in Muratori's Script. Rerum Italicarum.

JORTIN, JOHN, D.D., an eminent scholar and divine, was born of French Protestant parents in London, in 1698, and was educated at Cambridge. Here, under the instruction of Dr. Thirlby, he acquired so high a character for learning and acuteness, that he was recommended by his tutor to Pope, to extract the notes from Eustathius, to print with his translation of the Iliad. He took orders in 1724, and he served a chapel of ease to the parish of St. Giles in the Fields. In 1731, in conjunction with some learned coadjutors, he gave to the world Miscellaneous Observations upon Authors, Ancient and Modern (two volumes 8vo); and in 1751 appeared the first volume of his Remarks upon Ecclesiastical History, of which four volumes more were published in 1752 and 1754, and two more after his death in 1773. In 1755 he published Six Dissertations upon Various Subjects. In 1758 he published his Life of Erasmus (4to); in 1760 another 4to volume, entitled Remarks upon the Works of Erasmus. In 1762 he received the living of Kensington, the duties of which he performed for the remainder of his life. In 1764 he was made Archdeacon of London, and died August 20, 1770. Besides the works already mentioned, Dr. Jortin was the author of Remarks upon Spenser (1734, 8vo); Remarks on Seneca; Letters on the Music of the Ancients; Lusus Poetici, a volume of Latin poems; and other miscellaneous productions, published in two volumes. Seven volumes of his Sermons and Charges were also published after his death, in 1771 and 1772.

JORULLO, XORULLO, or JORUYO, a volcano of Mexico, in the department of Michoacan, 160 miles south-west of Mexico; 80 miles distant from the Pacific. Though the rocks of the region must have been produced by igneous action, the district had continued undisturbed from the discovery of the New World, and the plain of Malpais, from which Jorullo rises, was covered by fertile fields, and watered by the Cuitimba and San Pedro. This state of tranquillity was suddenly disturbed in June, 1759, by hollow sounds, succeeded by earthquakes. These had continued for two months, when, in the night of September 28th to 29th, flames burst forth from the ground, and fragments of burning rocks were thrown up to prodigious heights. On the line of a chasm which had been made six volcanic cones, consisting of scoria and lava, were formed; the loftiest, to which the name of Jorullo has been given, was 1600 feet above the level of the plain. It continued to send forth great streams of basaltic lava, containing fragments of granite, till February, 1760. The ground, to the distance of nearly 2 leagues round the volcano, was thrown up so as to form a steep precipice round its margin of 30 to 35 feet in height. The total height of the volcano above the sea is about 4150 feet. There are but few signs of activity about the mountain now; vegetation has made great progress on the sides of the new hills; and the surrounding country, which had been deserted as uninhabitable, is again covered with luxuriant crops of sugar-cane and indigo.

JOSEPH, one of the two sons of Jacob's favourite wife Rachel. His father's preference for him tempted him to assume towards his elder brothers the part of a censor and informer, hardly a modest or prudent part to be taken by a youth of seventeen. Stung with envy and with the arrogance which they thought was displayed in his dreams, his brothers sold him to some Ishmaelitish slave-dealers, by whom he was sold to Potiphar, a distinguished officer in Egypt. The prudence and fidelity which he displayed in the service of his master ameliorated his condition; but his refusal to comply with the unlawful desires of Potiphar's wife caused him to be thrown into prison, at her instigation. Yet, even here, Joseph was able to gain the confidence of the keeper; and the interpretation which he gave to a dream of the king's butler, who was likewise in prison, opened for him the way to a better fortune; for, after the butler had been restored to favour, Pharaoh and his whole court were troubled by two dreams, which none of the scribes nor wise men of Egypt could interpret. The butler remembered the Hebrew boy who had given so happy an interpretation to his own dream when in prison. Joseph was brought to court, and explained the king's dreams of seven fat and seven lean kine, and the two stalks of wheat. Seven years of abundance, extraordinary even for fruitful Egypt, were to be followed by seven years of still more extraordinary dearth. Joseph suggested wise measures for preserving the people from famine during the unproductive years which he had predicted, and Pharaoh committed to him the charge of carrying them into execution, and raised him to the position of vicegerent over Egypt, giving him the royal signet itself, a collar of gold, and causing him to ride in the second royal chariot. He received the name of Zaphnath Paaneah (revealer of secrets), and married Asenath, an Egyptian nobleman's daughter, by whom he had two sons born during the seven years of plenty. In the years of famine his brothers came to buy corn from the stores which he had collected in Egypt. Without making himself known to them he endeavoured, by some harsh treatment, to discover their thoughts, and to make them repent of the wrong they had done him. On their second visit, when, according to his instructions, they had brought his younger brother Benjamin, his feelings overcame him, and he disclosed himself to his brethren, and provided them and his father with lands in Egypt. He was now their benefactor, and therefore Jacob, in his last blessing, gave to his two sons equal rights with the other brothers, and the two tribes of Manasseh and Ephraim preserved the memory of Joseph among the Hebrews. He died at the age of 110 years, was embalmed and placed in a sarcophagus, to be finally buried according to his wish at Shechem, when the Israelites were led out of Egypt.

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JOSEPH II., German Emperor, son of Francis I. and Maria Theresa, was born March 13, 1741. His education was carefully superintended by Prince Batthyani and Bartenstein, the secretary of state. On the outbreak of the Seven Years' war he wished to take a personal share in the struggle, but Maria Theresa withheld her permission. In 1760 he married Elizabeth of Parma, who died on her second confinement. He also lost his second wife, a Bavarian princess. He was elected King of the Romans in 1764, and on the death of his father, 1765, German Emperor. His mother declared him co-regent in the hereditary states of the house of Austria, and gave him the command of the army; but the real authority remained in her hands. In the earlier part of his reign he employed his time in travelling and becoming acquainted with his states. On one of these journeys, under the title of Count Falkenstein, he visited Frederick the Great in his camp at Neisse, August 25, 1768. In the following year the emperor, in his camp, received a visit from Frederick. In 1777 Joseph made a journey to Paris, where he spent six weeks. At the end of this year the elector of Bavaria died, and the war of the Bavarian Succession broke out between Prussia and Austria, to which Maria Theresa put an end, contrary to the wishes of her son, who was desirous of measuring himself in the field with his great adversary. In 1780 Joseph came into the possession of full dominion over his hereditary states. He allowed a greater freedom of the press, put an end to the connection between Rome and the religious orders, diminished the pensions, placed the Jews on a better footing, abolished bondage, suppressed all nunneries, and many monasteries, particularly those in which there were no schools, or the sick were not taken care of, or the monks did not preach. In the spring of 1782 Pope Pius VI. made a visit to Vienna. Joseph afterwards returned his visit at Rome, still continuing to suppress monasteries, so that in eight years the number of persons belonging to the different orders had sunk from 63,000 to 27,000. All branches of the government, public education, the police, the state of the clergy, and the peasantry, were reformed. By a new code of laws capital punishments were abolished. In 1784 he had a dispute with Holland concerning the free navigation of the Scheldt, and the negotiations for the exchange of the Netherlands for Bavaria, against which the confederacy of the German princes was formed, in 1785. In 1787 Joseph made a journey into the Crimea, where Catharine gave him a most splendid reception at Cherson. After his return he experienced a series of misfortunes. Disturbances having broken out in the Netherlands, Joseph discontinued his reforms, and quiet seemed to be restored. February 9, 1788, he declared war against the Turks. By the defeat at Lugos (September 20, 1788) the army was obliged to retreat, and suffered dreadfully in consequence of the heat and the unhealthiness of the country. Joseph himself returned sick to Vienna in December. In the following year fortune favoured the Austrian arms, and Belgrade surrendered. The principal cause of the difficulties which Joseph next had to encounter was the tax law, introduced in Nov. 1789. The nobility and peasantry showed themselves equally dissatisfied, and the signal was given for open rebellion. The Netherlands declared themselves independent, and expelled the imperial forces from all the provinces, and Luxemburg alone remained in the possession of the imperial troops. The Hungarians, also, whose general dissatisfaction had been only slumbering, rebelled, and demanded the restoration of their ancient rights and constitution. To the astonishment of all Europe Joseph, in January, 1790, declared all the acts of his government in that country revoked, even to the edict of toleration (June 22, 1781). Tyrol showed signs of dissatisfaction, and Joseph hastened to put everything on its former footing. His health sunk under these accumulated mortifications, and on the 20th February, 1790, he died of consumption. Joseph was a man of considerable ability, and had the permanent welfare of his people thoroughly at heart. Whatever his own reflections or his knowledge of other countries showed to be useful, he wished to introduce. But he did not sufficiently consider that he had to do with other men who would not see things in the same light as himself; that long habit rendered it difficult to change, at once, usages sanctified by time; and that other men did not possess his knowledge and experience.

JOSÉPHINE (*Rose-Tascher de la Pagerie*), Empress of the French, was born in Martinique June 24, 1763. At the age of fifteen she accompanied her father to France, and was married, 13th December, 1779, to Vicomte Alexandre Beauharnais, by whom she had two children, Eugène, afterwards duke of Leuchtenberg, and Hortense, afterwards queen of Holland and mother of Napoleon III. During the Reign of Terror her husband was thrown into prison, and executed. She was also included in the list of proscription; but the death of her husband reduced her to such a state that she could not be removed, and to this circumstance she owed her escape from execution. Robespierre at length perished, and the viscountess was liberated through the influence of Tallien. Joséphine was indebted to Barras for the restoration of a part of the property of her husband, and at his house, after the 13th Vendémiaire, she met General Bonaparte. It was a favourite project of Barras to promote a marriage between her and the future emperor, an event which took place in 1796. She accompanied her husband in his Italian campaign, and her whole life became intimately connected with that of Napoleon, at whose side she stood like a good genius. She was always benevolent, and accessible to any who sought protection or mercy from Napoleon through her. Bourrienne tells us that some shameful calumnies rendered General Bonaparte jealous while in Egypt, but that soon after his return everything was adjusted. Joséphine used her influence in favour of many emigrants, encouraged arts and industry, and protected the humblest artists whom she found worthy. Polignac and Rivière owed their lives to her. Her court was no less admired in France than she herself was beloved. She loved pomp, and was censured by the emperor for her lavish expenditure. When Napoleon ascended the throne a divorce was proposed, but the emperor rejected the proposition. Joséphine was crowned at Paris and at Milan. When Napoleon became desirous of marrying a princess by whom he might have issue, Joséphine having no children by him, she felt it deeply, yet she had firmness enough to consent to what he thought best for France and for himself. She retired to her beautiful seat of Malmaison, with the title empress-queen-dowager, where the respect and the love of all the French followed her. She was doomed to see the destruction of that throne on which she had once sat. The Emperor Alexander and the King of Prussia, but particularly the former, showed their respect for her virtues by repeated visits to Malmaison; but the fate of Napoleon undermined her strength, and she died in the arms of her children, May 29, 1814.

JOSEPHUS, FLAVIUS, the historian of the Jews, was born at Jerusalem 37 A.D. By his mother's side he was descended from the Asmonæan princes, while from his father, Matthias, he inherited the priestly office, and belonged to the first of the twenty-four

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courses. At the age of fourteen he had made such progress in learning that he was frequently consulted concerning difficult points of the law. Two years later he resolved to study the doctrines of the three principal Jewish sects, the Sadducees, Pharisees, and Essenes. Having heard that a celebrated member of the latter sect, named Banus, lived an ascetic life in the desert, Josephus joined him, and passed three years in his society. He then returned to Jerusalem, and became a Pharisee. When he was twenty-six years old he made a journey to Rome to obtain the liberation of some priests who had been sent there by Felix to be tried on some trivial charge. He was shipwrecked in the Adriatic, but was picked up by a vessel of Cyrene and landed at Puteoli. Here he became acquainted with an actor, through whose means he was introduced to the wife of Nero, who procured the liberation of the priests. On his return to Jerusalem he found his countrymen preparing for war with Rome. Recognizing the hopelessness of such a struggle, he tried to dissuade the Jews from entering into it, but in vain. When all hope of peace was lost he joined the war party, and was deputed to defend the province of Galilee. On the approach of Vespasian's army he retreated to Jotapata, a fortified town, which he held against the whole Roman army for forty-seven days. The town was betrayed to the enemy. Josephus was discovered in a cave, where he had concealed himself, and was given up to the Roman general, who was about to send him to Nero, when, as it is related, he predicted that Vespasian would one day enjoy the imperial dignity, and thereupon had the good fortune to obtain both freedom and favour. This induced him, when he went with Titus to Jerusalem, to advise his countrymen to submission. After the conquest of Jerusalem he went with Titus to Rome, and wrote the History of the Jewish War, in seven books, both in the Hebrew and Greek languages—a work which resembles the writings of Livy more than any other history. His Jewish Antiquities (in twenty books) is likewise an excellent work. It contains the history of the Jews from the earliest times till near the end of the reign of Nero; but it is censured as giving an incorrect account of the miraculous events which have occurred in Jewish history, and as suppressing or altering everything which might have given offence to the heathen. His two books on the Antiquity of the Jewish People contain valuable extracts from old historians, and are aimed at Apion, an Alexandrian grammarian, and an open adversary of the Jews. The date of his death is uncertain; all that is known is that he survived Agrippa II., who died in 97 A.D. The commonest English version is that by Whiston.

JOSHUA, the successor of Moses in the command of the Israelites, was the son of Nun, of the tribe of Ephraim. His name was at first *Hoshea* (help), but was changed by Moses into *Joshua* (Jehovah's help), of which *Jesus* is the Greek form. He gained the victory over the Amalekites at Rephidim, accompanied Moses part of the way in his ascent of Mount Sinai, was deputed with eleven others to explore the land of Canaan, and was the only one, with the exception of Caleb, who brought back an encouraging report. In consequence of this he received special marks of divine favour, and was nominated by Moses to succeed him in the command of the army of Israel. He led the Israelites over the Jordan, and in the course of seven years conquered the greater part of Palestine, and divided the country among the tribes. According to Josephus he governed Israel for twenty-five years. He died at the age of 110. His history is contained in the canonical book which bears his name, and of which he has been usually regarded as the author, both by the Jewish writers and the Christian fathers. Many modern critics, however, suppose it to have been written by Samuel, Eleazar, or Phinehas; and some place its date of composition so late as the Babylonish captivity. The entire book, in its present form, could not have been written by Joshua, for there are many references in it to events which took place after his death; but there can be little doubt that the great part of the material was supplied by Joshua, or an eye-witness of the events therein described. The book may be regarded as consisting of three parts: 1, the conquest of Canaan, chaps. i.–xii.; 2, the partition of the country, chaps. xiii.–xxii.; 3, Joshua's convocations of the people, his addresses, and death, chaps. xxiii. xxiv. There is a Samaritan book of Joshua (published in Arabic and Latin, by Tuynboll, Leyden, 1848), which is a chronicle of events from the death of Moses to the time of Alexander Severus. It is supposed to have been written about 1300 A.D.

JOSIAH, King of Judah, succeeded his father Amon at the age of eight years (639 B.C.) After a minority of eight years, during which he was educated and the administration of state affairs carried on by the high-priest, he began to free the land of idolatries, though the groves and altars consecrated to impure worship were favoured by men of rank and influence in the kingdom. Supported by the friendship of the King of Assyria he even extended his reforms into the Kingdom of Israel. In the eighteenth year of his reign he commenced the restoration of the temple, and during its progress Hilkiah discovered the book of the law. On hearing the predictions against the people for their idolatry he rent his clothes, and sent the high-priest to consult Huldah the prophetess, who confirmed the prediction, but added a message of comfort to the king. As he had shown a tender heart and humbled himself before God, he would not see the calamities that were to befall the nation. He continued his reforms vigorously, and celebrated the greatest passover since the time of Moses. Soon after Necho, king of Egypt, who had invaded Assyria, advanced to attack Carchemish, which commanded a chief fort of the Euphrates. Prompted probably by loyalty to Babylon Josiah marched out against him, although Necho had sent him a friendly warning. The two armies met at Megiddo, where Josiah was slain in the thirty-first year of his reign.

JÓSIKA, MIKLÓS, BARON, a Hungarian novelist, was born at Torda, in Transylvania, in 1796. At the age of sixteen he entered the Austrian army, which he left in 1818 with the rank of captain. Having married a wealthy heiress, he lived alternately on his estates in Transylvania and in Pesth, chiefly engaged in literary pursuits, but also taking an active part in the political struggles of the time. After the reunion of Transylvania with Hungary in the spring of 1848 he became a member of the upper house of the Hungarian diet, was a zealous supporter of Kossuth, and on the resignation of the Batthyáni ministry was appointed a member of the committee of national defence. He followed the revolutionary government to Debreczin and Arad, and after its overthrow effected his escape to Brussels in 1850. He was condemned to death in his absence, and was hanged in effigy with Kossuth and others at Pesth in September, 1851. He resided in the Belgian capital, occupied with literary work, until his death, 27th February, 1865. He was a very prolific writer, and has been called the *Walter Scott* of Hungary. His chief romances are Abafi, his first and best; Az utolso Batóri (The Last Batóri); Zryni a Költö (Zryni, the Poet); Jósika István (Stephen Jósika); A' Csehek Magyarországban (The Bohemians in Hungary); Egy Magyar Csalad a' Forradalom alatt (A Hungarian Family during the Revolution), &c. They have been

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translated into German partly by Klein and partly by his second wife, the Baroness Podmaniczy, one of the most gifted ladies of Hungary.

JOSQUIN DE PREZ, ADRIAN (JOSQUINUS or JODOCUS DE PRATO), one of the greatest musical masters of the Netherlands, who received the surname *Prato* from his residence during several years at Prato in Tuscany. He is supposed to have been born between 1450 and 1455. After having studied with Ockenheim, the founder of the second Flemish school of music, Josquin went to Italy, received an appointment in 1475 in the Papal chapel, and acquired so much reputation by his *motettes*, masses, and other church compositions that he was invited to Cambray, made chapel-master to Louis XII. and Francis I., and then to the German Emperor Maximilian I. He died at Brussels, where his tomb is shown in the church of St. Gudule. He was justly admired as a contrapuntist a hundred years before Palestrina and Orlando di Lasso. 'Josquin,' said Luther, after having heard one of his masses, 'is master of the notes: they must do as he chooses: other composers must do as the notes choose.'

JOUBERT, BARTHÉLEMY CATHERINE, a general of the French Republic, born in 1769 at Pont de Vaux, in the department of Ain, entered an artillery regiment in his fifteenth year, but at the request of his father obtained his discharge, and had made some progress in the study of law at the outbreak of the Revolution. In 1791, still retaining his inclination for a military life, he joined a volunteer battalion, and distinguished himself on several occasions. After passing through the different gradations of rank he was appointed general after the battle of Loano. In this capacity he took an important part under Bonaparte in the campaign of 1796, and rose to be a general of division. Although suffering much from wounds, he opened the campaign of 1797 by opposing the progress of General Alvinczy, who was advancing from the Tyrol. A keenly-contested struggle was followed, two days after, by the bloody battle on the Plateau of Rivoli, where, owing especially to Joubert's exertions, victory declared for the French. Shortly after he drove back the enemy, and gained possession of Trent. Still pursuing his advantage, he forced his way into the interior of the Tyrol, successfully encountered all the forces opposed to him, overcame all the difficulties of the passage from the valley of the Adige into that of the Drave, and at last, near the source of that river, joined the grand army under Bonaparte, bringing with him 7000 prisoners, some colours, and cannon. Shortly after, having proceeded with the colours to Paris, he was employed in Holland, and in 1798 succeeded Brune in the command of the army of Italy. On the recommencement of the war with Austria, as the Sardinian court had given symptoms of a hostile disposition, he burst suddenly into Piedmont, took Turin and the other fortified places, and with the aid of the republican party forced the king to abdicate. He was pursuing a similar course in Tuscany and other parts of Italy when he incurred the displeasure of the Directory. Returning to Paris, he allowed himself to be gained over by Siéyès' party, who were endeavouring to overthrow the Directory and the constitution. To furnish him with the means of extending his fame this party managed to supplant Moreau and give Joubert his command in Upper Italy. He accordingly hastened from Paris at the commencement of 1799, with the determination to fight an important battle or perish in the attempt. The opportunity occurred sooner than he expected, and he suddenly found himself in front of the combined Austrian and Russian armies under Suwarrow. While he was hesitating whether to accept the battle or retreat into the Apennines the enemy commenced the attack, and Joubert fell almost at the first onset, struck down by a cannon-ball. Bonaparte afterwards caused his bones to be interred in Fort la Malgue, in Toulon.

JOUDPORE. See JODHPUR.

JOUFFROY, THÉODORE SIMON, a French jurist and philosopher, born at Pontets, in the Jura, 7th July, 1796, entered the École Normale of Paris in 1814, and studied philosophy under Cousin with so much distinction that in 1817 he was appointed Maître de Conferences in that school, and assistant professor of philosophy at the Collége Bourbon, afterwards known as the Lycée Bonaparte. Bad health obliged him in 1821 to resign the former situation; and the normal school having been suppressed the year after, he commenced a course of private lectures, which were numerously attended. In 1824 he founded, in concert with Dubois and Damiron, the newspaper called the Globe, which afterwards contributed powerfully to the progress of liberalism. In 1829 he became assistant to Milon as professor of philosophy to the Faculté des Lettres, and retained the situation till the revolution of July, when he became the colleague of Royer Collard in lecturing on the history of modern philosophy. At the same time he obtained an appointment as teacher of philosophy in the normal school. In 1832 he succeeded Thurot at the College of France, and in 1833 was admitted a member of the Academy in the department of moral and political science. When Cousin became minister of education he named Jouffroy a member of the council of the university. In 1831 he obtained a seat in the chamber of deputies, where he joined the party known by the name of Doctrinaires, and attached himself particularly to Guizot. His philosophy is very much allied to that of the Scottish school, and with the view of furthering it he became translator both of the Outlines of Moral Philosophy, by Dugald Stewart, and of the works of Reid. His own principal works are Mélanges Philosophiques (1833), consisting of his most important contributions to the Globe and Cours de Droit Naturel, composed of his lectures. He died in 1842.

JOUGS, JUGGS, or JOGGS, a term obviously connected with the Latin *jugum*, and in Scotland applied to an iron collar attached by a short chain to a pillar or wall in some public place, and intended to inclose the neck of a culprit convicted of some civil or ecclesiastical offence. This instrument of punishment was not peculiar to Scotland, for it was used at least in Holland. The collar consisted of two semicircles of iron united behind by a hinge, and secured in front by a staple. They have long ceased to be used, but as matters of curiosity and antiquarian interest they are still allowed to hang at a few country churches and rural court-houses and prisons. One may be seen at the church-yard gate of Duddingston, a hamlet in the neighbourhood of Edinburgh, and another attached to the wall of the ancient court-house of the village of Kilmaurs in Ayrshire.

JOULE'S MECHANICAL EQUIVALENT OF HEAT, an expression connecting heat and mechanical work, determined between 1843 and 1849 by Mr. Joule of Manchester, by means of experiments which rank amongst the most memorable that have ever been made. Davy proved that the heat of a body is really the motion of its particles, that is, that heat is a form of energy, and that therefore the laws of communication of heat are precisely the same as the laws of communication of mechanical energy. Benjamin Thompson, count of Rumford (1798), experimenting on the heat produced in the boring of cannon, determined the mechanical energy which is equivalent to a certain quantity of heat; his re-

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markable experiments were incomplete, but they result in a pretty close approximation to Joule's equivalent. In 1824 Carnot published an axiom which is of great importance in thermodynamics. If a body after having experienced a certain number of transformations be brought identically to its primitive physical state as to density, temperature, and molecular constitution, it must contain the same quantity of heat as that which it initially possessed. Séguin in 1839, and Mayer in 1842, neglected Carnot's axiom; they assumed that the mechanical work done by a body in producing a dilatation of itself, or done by external agents in producing a compression, is equivalent to the heat lost or gained by the body. They had no right to make such an assumption, which (as was proved afterwards by Joule) is only approximately true in the case of air and the other incondensable gases. Séguin experimented on dilating steam, but Mayer was fortunate enough to employ the compression of air, and he has in consequence obtained an inconsiderate amount of credit. Mayer's determination of the 'equivalent' was inaccurate, as he employed an inaccurate specific heat for air.

Joule began his experiments in 1843; he recognized Carnot's axiom, and employed truly scientific methods. In 1843 he measured the work done in driving a magneto-electric machine, and the heat generated in the machine and its conducting wire. He also moved a piston formed of capillary tubes in a cylinder containing water; the work done in moving the piston, and the heat produced by friction in the tubes, were measured with great accuracy. In 1844 he experimented on air by Séguin and Mayer's methods; he proved by experiment that these methods are legitimate in the case of air. In 1845 and 1847 he determined the heat produced by the friction of water, oil, and mercury. In 1849 his experience had enabled him to eliminate sources of error, and to perfect his apparatus; his results from the friction of water, oil, mercury, and cast-iron were nearly identical. A paddle-wheel of brass or iron, with eight or six vanes, was caused to revolve between four sets of stationary vanes, in a vessel of water or oil or mercury; or two cast-iron bevel-wheels rubbed on each other in a vessel of mercury; in every case motion was produced by the falling of a certain weight through a certain distance. Great care was taken in calculating the heat produced by friction, and the work done by the falling weight. In the conclusion of his paper (1849) he makes allowance for loss of energy in vibration and sound, and established that:—the quantity of heat capable of increasing the temperature of 1 lb. of water (weighed in vacuo at a temperature of between 55° F. and 60° F.) by one degree Fahrenheit, requires for its evolution the expenditure of mechanical energy represented by the fall of 772 lbs. through the space of one foot. If one degree Centigrade is the rise of temperature, Joule's mechanical equivalent is 1389·6 foot-pounds.

1843.—Mean of results with magneto-electric machine,	836
1843.—Result from friction of water in narrow tubes,...	770
1844.—Mean of results of experiments with dry air,....	798
1845.— „ „ from friction of liquids,.....	817
1847.— „ „ „ „	781·8
1849.—Mean from 40 experiments on the friction of water,.....	772·092
Mean from 60 experiments on the friction of mercury,.....	774·083
Mean from 20 experiments on the friction of cast-iron,.....	774·987

JOURDAN, Jean Baptiste, Count, marshal and peer of France, born at Limoges 29th April, 1762, when very young entered an infantry regiment which was despatched to America to aid the United States in their struggle for independence. The liberal ideas there imbibed made him on his return a zealous adherent of the revolutionary party. In 1790 he became captain of the national guard of his native town, and the following year he proceeded to the army of the north at the head of a volunteer battalion. His skill and courage made his advancement very rapid, and as early as 1794 he was placed at the head of 87,000 men, to reinforce the army of the Meuse and Sambre. Shortly after he defeated the enemy at Fleurus, took Mons, Brussels, Liége, Condé, and Valenciennes, and on the Roer gained a victory which obliged the Austrians to retire behind the Rhine. But 3d September, 1796, he was defeated at Würzburg by the Austrians under the Archduke Charles, in consequence of which he laid down his command, and returning to Paris became a member of the council of five hundred. In 1799, the Directory having given him the command of the army on the Danube, he crossed the Rhine at Basel, and pressed forward between the Danube and the Lake of Constance, but was encountered by the Archduke Charles, who first gave him a check at Ostrach, and then completely defeated him at Stockach. Although he had opposed the *coup-d'état* of 18th Brumaire, the first consul intrusted him in 1800 with the reorganization and administration of Piedmont. While thus employed he is said to have given proof of great disinterestedness. In 1803 he became a member of the senate, and in 1804, on the establishment of the empire, obtained the rank of marshal and a seat in the council of state. Napoleon did not venture to intrust him with an independent command, but gave him an appointment as major-general beside King Joseph, in whose service he took an active part both in Naples and Spain, though in the latter certainly not much to the advantage of his master. After Napoleon's return from Elba he remained without employment, and in 1815, when appointed president of the court-martial which was to try Ney, incurred the displeasure of the Bourbons by declaring the court incompetent. In 1816 he was appointed commander of the seventh military division, and in 1819 was raised to the peerage. He entered with spirit into the July revolution, for some days acted as foreign minister, and was afterwards made governor of the Hôtel des Invalides. Though he had many opportunities of enriching himself, he was always poor. He died 23d November, 1833.

JOVELLANOS, Gaspar Melchior de, was born in Gijon in the Asturias, January 5, 1744, of an ancient and noble family, and studied at Oviedo, Avila, and Alcala de Henares. As soon as he left college he was made a member of the criminal branch of the *audiencia* in Seville. He advanced rapidly in his professional career, and was finally appointed a member of the council of the military orders at Madrid. Here he became a member of the Real Sociedad economica Matritenze de Amigos del Pais, an institution intended for the promotion of agriculture, manufactures, and trade; and it was by the command of this body that he wrote his celebrated Informe sobre un Proyecto de Ley Agraria, to which he mainly owes his fame. Intrigue led to his disgrace at court, and he was banished to his native place, where he remained from 1790 to 1797, entirely devoted to his various studies and useful projects, including among other things the working of coal-mines. He also founded the royal Asturian institution—his darling project up to the last moments of his life. Meanwhile Don Manuel Godoy, afterwards Prince of Peace, had become prime minister, and Jovellanos was again invited to office, which he accepted with great reluctance. He was made minister and a colleague of Francesco de Saavedra. They were both sensible of the miserable character

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of the government of Godoy, and prevailed on the king to dismiss him. Saavedra was appointed in his place minister of foreign affairs. But this administration was soon dissolved, and both lost their places. The revenge of the Prince of Peace was slow but deep. Marquis Caballero was chosen to persecute him. A Spanish translation of Rousseau's Contrat Social, in one of the notes of which Jovellanos was mentioned favourably, gave the pretext. He was arrested, carried from one place to another, and at last put in a Carthusian monastery in the Island of Majorca. When Charles IV. was compelled to abdicate in favour of his son Ferdinand, with whom Caballero had sided, Jovellanos was recalled by the same person who had shamefully persecuted him. He demanded a trial; but Napoleon's stroke at Bayonne changed the face of Spanish affairs. Joseph, his brother, offered Jovellanos the portfolio of the interior; but he embraced the cause of the insurgents, and became a member of the central junta, where it was chiefly owing to him that the council was revived. No sooner had the council met than it opposed the central junta, which was finally dissolved, and Jovellanos was shamefully treated. To expose the council and defend himself and the junta was the last of his labours as a writer. He died November 27, 1811, sixty-seven years old. The Spanish prose of Jovellanos is considered the finest of modern times. It is mainly as a political economist and a writer on law that he stands in the front rank as a Spanish writer; but his Elogios possess great beauty of language and depth of thought. He also wrote an Essay upon Dramatic Exhibitions and Public Diversions, some poems, a tragedy (El Pelayo), and a translation of the first book of Milton. Collected editions of his works have been published in seven vols. at Madrid (1830–32), and at Barcelona in 1839.

JOVIANUS, FLAVIUS CLAUDIUS, Roman emperor, was son of Comes Varronianus, a distinguished soldier, and obtained an appointment in the household of the Emperor Julian, of whose life-guards he was captain. Having accompanied him in the disastrous campaign against the Persians, in which Julian lost his life (A.D. 363), he was proclaimed emperor by the troops, and immediately declared himself a Christian. His first great difficulty was to effect the retreat of the army, and he was only able to accomplish it by negotiating with Sapor, the victorious Persian monarch, and formally ceding to him five provinces beyond the Tigris. His reign, which had not lasted eight months, was suddenly terminated at Dadastana, a small town in Galatia, where he is supposed to have been accidentally suffocated in his bed by the fumes of charcoal on the 16th of February, 364. There is no evidence for the supposition that has been hazarded of his having died a violent death. His only measure of importance was the issuing of an edict by which he secured the Christians from persecution by placing Christianity on a legal basis, but at the same time proclaimed a kind of general toleration.

JOVIUS, PAULUS, or PAOLO GIOVIO, a celebrated Italian historian, was born at Como, 19th April, 1483, studied medicine at Pavia, but took orders, and was Bishop of Nocera at the time of his death, 11th December, 1552. In his youth he read the classics under the direction of his brother at Rome, and was inspired with the desire of becoming the historian of his time. His first attempt was read by Pope Leo X., who became his patron, to an assembly of cardinals, and the pontiff exclaimed that, 'after Titus Livy, there is no writer more elegant and eloquent.' As Jovius lived at the court of the pope, then still to a certain degree the capital of Christendom, he became personally acquainted with many individuals of the first importance in history, or other eye-witnesses, from whom he gathered information. At the conference between Charles V. and Clement VII. at Bologna in 1530 the emperor furnished him with a circumstantial account of his expedition to Tunis for insertion in the history he was then writing. His style is not unfrequently too florid or diffuse, and his statements may perhaps be coloured by his partialities. His Latin is very excellent, but the deep views of a Machiavelli are wanting. His works are—Historiæ sui Temporis (1494–1547), lib. xlv. (two vols., Florence, 1550–52, folio); Elogia Virorum eruditorum (Florence, 1549, folio); Elogia Virorum bellica Virtute illustrium (Florence, 1551, folio); Commentarii delle cose de' Turchi (Vinegia, 1541); Descriptio Britanniæ, Scotiæ, Hiberniæ, et Orcadum (Venetia, 1548, 4to). A complete edition of his works in two vols. folio was published at Basel, 1578.

JOYEUSE ENTRÉE, the name given to the important privileges of the estates of Brabant and Limburg, with Antwerp, which the dukes were obliged to swear to maintain before they were allowed to enter the ducal residence, from which circumstance the name was taken. The most important of these privileges was that the people were released from an allegiance whenever the duke should attempt to violate their rights. So important were these privileges considered that many women went to Brabant to be confined there, that their children might enjoy the rights of a citizen of Brabant.

JUAN (pronounced *huan*, with a very aspirated *h*). *Juan* is the Spanish name for *John*, and a character named *Don Juan* is found in the literature of most of the modern nations of Europe. He is the embodiment of godless sensuality. As far as we know, this character first appears in the Burlador de Sevilla y Convidado de Pierra, a comedy by Gabriel Tellez, commonly called *Tirso de Molina*. It is well known that the early French dramatic poetry was much influenced by the Spanish, and the Convidado de Pierra was reproduced by Molière as Don Juan, ou Le Festin de Pierre (1669), a comedy in five acts, after the Spanish piece had already met with great success in an Italian dress in Italy. Shadwell brought it on the English stage (1676) under the title of The Libertine. This name has derived its greatest fame, however, from the opera of Mozart, called Don Juan, one of his most brilliant compositions. The variety of sentiments which the grand composer was able to express in this opera gave to his vast genius an opportunity to treat, almost in the same breath, the most ludicrous and the most sublime subjects. Don Juan is justly one of the most popular compositions of the German opera. In all these works Don Juan is a travelling rake who practises everywhere the arts of seduction. He is equally successful in the higher and the lower ranks, and having invited the marble statue of a commander to sup with him, is horrified by seeing the statue actually descend from his marble steed to accept the offer. He is finally consumed by flames from the infernal regions. Vincenzo Righini first put the legend into an operatic form in 1777, and the text of Mozart's Don Giovanni was written ten years later. The Don Juan of Lord Byron bears no relation to the old story but in name and in the libertine character of the hero.

JUAN FERNANDEZ, so called from the name of its discoverer, also sometimes Mas-a-Tierra, an island in the South Pacific Ocean, about 400 miles off the coast of Chile, to which it belongs. It is 18 miles long and 6 miles broad at the broadest part, and has on its north-east side the excellent harbour of Cum-

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berland Bay. It is mostly formed of a series of mountains, the highest rising to the height of 3000 feet, of rugged and arid aspect. Basalt, granite, and trap are the principal rocks. A considerable portion of the island is well wooded, while in some parts there are grassy plains abundantly supplied with a species of oat that grows very luxuriantly. The neighbourhood of Cumberland Bay is overgrown with strawberry plants, wild radishes, mint, and balm, besides peach, apple, cherry, and fig trees, which grow everywhere wild. Wild goats are plentiful in the more inaccessible parts, whither they have been driven by the dogs that run wild. Rats are numerous. Excellent fish are taken here, and large craw-fish abound. The island is occupied by some hundreds of settlers, whose chief occupation is the furnishing of fresh vegetables, water, and wood to the whaling or other vessels that call here. De Foe is said to have founded his Robinson Crusoe on the history of the solitary residence here for over four years (1704-1709) of a Scotch sailor, Alexander Selkirk. Near Juan Fernandez are the small islands of Mas-a-Fuera and Santa Clara or Goat Island.

JUBA I., a king of Numidia and Mauritania, was the son of Hiempsal, who had been re-established on the throne by Pompey. Consequently, on the breaking out of the civil war, Juba naturally favoured the cause of Pompey against Julius Cæsar, and after the battle of Pharsalia joined his forces to those of Scipio. He was conquered in a battle at Thapsus, and totally abandoned by his subjects. The inhabitants of the strong city of Zama, where he had deposited his wives, children, treasures, and military stores, having shut the gates against him, he abandoned all hopes of safety and slew himself with his own hand, after having killed Petreius, who had shared his good fortune and his adversity, B.C. 46. His kingdom became a Roman province, of which Sallust was the first governor.

JUBA II., a son of Juba I., was led among the captives to Rome to adorn the triumph of Cæsar. In his captivity he applied himself to study, with such diligence that he turned out one of the first scholars of his day. He gained the hearts of the Romans by the courteousness of his manners, and Augustus rewarded his fidelity by giving him in marriage Cleopatra, the daughter of Antony, conferring upon him the title of king, and making him master of all the territories which his father once possessed, B.C. 30. The exact period of his death is not known, but he probably survived till 18 or 19 A.D. The Mauritanians rewarded his benevolence by making him one of their gods. Pausanias mentions that the Athenians erected a statue in his honour, and the Æthiopians are said to have worshipped him as a deity. Juba wrote a history of Rome in Greek, which is often quoted and commended by the ancients, especially by Pliny. Only a few fragments of it remain. He also wrote on the history of Arabia, and the antiquities of Assyria, chiefly collected from Berosus. Besides these he composed some treatises upon the drama, Roman antiquities, the nature of animals, geography, painting, grammar, &c., now lost. The Abbé Sevin furnished an elaborate account of his life and writings to the fourth vol. of the Mémoires de l'Académie des Inscriptions.

JUBILATE, the third Sunday after Easter. In the primitive church divine service was begun with the words of Psalm lxvi. 1—'Jubilate Deo, omnes terræ' (Sing to the Lord, all ye lands).

JUBILEE, one of the extraordinary festivals of the Jews, which was held every fiftieth year. This festival was proclaimed by the sound of trumpets through the whole country, on the evening of the day of atonement, about the autumnal equinox. It was distinguished by many eminent privileges. All slaves or captives were to be released. All estates which had been sold reverted to their original proprietors or their descendants, and a check was thus put to the accumulation of inordinate wealth in the hands of a few. It prevented the growth of a territorial oligarchy, and furnished an opportunity for the restoration of families who had, through fault or misfortune, been reduced to poverty. Houses in walled towns, however, were exempted from this provision. The assertion of Josephus that debts were remitted in this year has no confirmation from the Old Testament, or from any Jewish authority. On the contrary Maimonides says that the remission of debts was a point of distinction between the sabbatical year and the jubilee. During this year the ground was not cultivated. The political object of it was to prevent great oppression of the poor, as well as their liability to perpetual slavery. The distinction of tribes, too, was thus preserved, in respect both to their families and their possessions; for the law rendered it necessary for them to keep genealogies of their families, in order that they might be enabled to prove their right to the inheritance of their ancestors. The jubilee, too, probably assisted in the computation of time, like the Greek Olympiads, the Roman lustra, and the Christian centuries. It has been doubted whether the law of jubilee ever came into actual operation, and in later Jewish history no evidence of its observance is found.

In imitation of the Jewish jubilee (or as some later writers have endeavoured to prove, of the secular games of the Romans), the Roman Catholic Church instituted a year of jubilee, during which the popes grant plenary indulgences to all who, having confessed and partaken of the Lord's supper, shall visit certain churches. The first proclamation for a jubilee was issued in 1299, by Boniface VIII. The profit which the Romish chair drew from it, and the wish that more Christians might have an opportunity of partaking in it, induced Clement VI. in 1350 to declare every fiftieth year, then Urban VI. in 1389 every thirty-third year, in reference to the number of the years of the life of our Saviour, and Paul II. in 1470 every twenty-fifth year a year of jubilee. The quantity of money which the jubilee brought to Rome induced Paul to designate certain churches in the different countries of Christendom, where votaries who could not come to Rome might obtain the advantages of the jubilee, but on condition that the largest part of the profits of these provincial jubilees should flow into the treasury of the holy see. The money collected by means of these general indulgences was sometimes spent in wars against the Turks, and sometimes used to advance the building of the church of St. Peter's, which, ever since the sixteenth century, had been the standing pretext under which they were issued. The Reformation, to which the sale of indulgences gave the first impulse, sensibly diminished these profits, and the jubilee which Benedict XIV. proclaimed in 1750 had but little success, as also that of 1825, proclaimed by Leo XII., and that of 1850 by Pius IX. No jubilee was held in 1800, owing to the vacancy of the holy see and the troubles of the times. Every quarter of a century, on Christmas Eve, the pope opens with pomp the great door of St. Peter's, which, except on that occasion, is kept rigidly closed. An extraordinary jubilee is ordered by the pope on his accession, or when a critical juncture in the fortunes of the church seems specially to call for the offerings and prayers of the faithful.

JUDÆA. See PALESTINE.

JUDAH, the tribe and kingdom. See JEWS.

JUDAS, surnamed *Iscariot*, an epithet which has received many interpretations more or less conjec-

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tural, and sometimes called 'son of Simon,' one of the twelve apostles of Jesus, whom he betrayed into the hands of the Jewish priests, under the semblance of a friendly salutation. His divine Master addressed to him the mild reproof—Dost thou betray the Son of man with a kiss? Remorse for his crime led him to suicide. The Cainites, Cerinthians, and some other heretics held him in great veneration. Absolutely nothing is known of his life previous to the appearance of his name in the lists of the apostles.

JUDAS, brother of James, according to Luke one of the twelve disciples. Matthew and Mark call him *Thaddæus surnamed Lebbæus*. By many he is considered the author of the epistle which our translators call the Epistle of St. Jude, though the name in the Greek is the same in both instances. See JUDE (EPISTLE OF).

JUDAS MACCABÆUS, the third son of Mattathias, a priest of the course of Joarib, and founder of the Maccabæan dynasty, succeeded his father (B.C. 166) as the leader of the Jews in the war of independence against the Syrians under Antiochus Epiphanes. The emissaries of the Syrian king having required the Jews to offer idolatrous sacrifices, their overtures were rejected by Mattathias, who fled with his sons to the mountains, and was followed by numerous bands of fugitives. He destroyed the idolatrous altars, and restored the observance of the law. Dying soon after his son Judas assumed the command, and by his skill and intrepidity he gradually led on his countrymen from night attacks and sudden surprises to more open and important operations; and at length defeated Apollonius and Seron, who had marched to the attack with greatly superior forces, at Bethhoron, the scene of one of the most glorious victories in Jewish annals. Lysias, the lieutenant of Antiochus, headed an expedition against the patriots, but Judas encountered him, and defeated him with signal loss. Judas now occupied Jerusalem, purified the temple three years after its profanation, and reinaugurated the holy service. Despite his successes the position of Judas was anything but secure, and in 163 B.C. Lysias took Bethsura, and laid siege to Jerusalem. He had guaranteed to the Jews the liberty of their religion; but he was put to death by Demetrius, a new claimant of the crown, who sent Nicanor against Judas. The Jewish leader defeated him first in a battle at Capharsalama, and then with total ruin at Adasa, which practically decided the question of Jewish independence. Feeling the difficulty of continuing the contest against the whole power of the Syrian Empire, he solicited an alliance with the Romans. But a Syrian army again invaded Palestine, before aid could reach him from his new allies. To 22,000 Syrian troops, led by Bacchides, Judas could oppose only 3000. Though these had gradually diminished to 800 he resolved to attack the invaders, and after a desperate struggle he fell fighting with useless valour, B.C. 161. His brothers recovered his body, and buried him in the sepulchre of his fathers at Modin.

JUDAS TREE (*Cercis Siliquastrum*), natural order Leguminosæ, is a native of the Levant, Spain, south of France, Italy, &c. It grows to the height of about 20 feet. The bark is dark brown, the leaves are pale green on the upper surface, and grayish on the under side. The flowers are papilionaceous, of a bright purple, and very beautiful. The flowers are succeeded by long flat pods, containing each one row of seeds. This tree is cultivated in shrubberies and pleasure gardens. *C. Canadensis*, or red-bud, is a small ornamental tree growing in Canada and the United States. It is remarkable for the beauty of its rose-coloured flowers, which appear in profusion before the leaves.

JUDE, EPISTLE OF, one of the so-called *Antilegomena* (doubtful writings). Its canonicity was questioned by the primitive church, though its genuineness was not doubted among those by whom it was known. The Asiatic churches did not make use of it till the fourth century, nor was it known in the West till towards the close of the second. Its unimportance forbids the supposition of its being a forgery, and it was at length allowed to take its place with dispute as a portion of the sacred canon. Clement of Alexandria, Origen, Eusebius, and Jerome recognized its apostolic origin, but prejudice was early raised against it by its supposed quotation of apocryphal books. Doubts as to its canonical authority were revived at the Reformation, and these have been shared in by modern commentators. The identity of its contents with 2 Pet. ii. helped to swell the prejudice against its genuineness.

JUDGE, one invested with authority, by letters patent, to determine causes or questions in the highest courts of common law. As an epithet the word is not applied in Great Britain, as it is in America, to the highest class of judges; but Mr. Justice, lord chief-justice, chief baron, or lord chancellor, according to the court in which they preside. In Scotland the senators or judges of the College of Justice are individually called lord, prefixed either to their surname or to some other title assumed by them, generally territorial. By 12 and 13 Wm. III. cap. ii. it was enacted that the judges of the superior courts should hold their offices during good behaviour, and that they might not be lawfully removed, except on the address of both Houses of Parliament; and by 1 Geo. III. cap. xxiii. the judges are continued in their appointments notwithstanding any demise of the crown. Their full salaries are absolutely secured to them during the continuance of their commissions. It is a highly penal offence to assault or threaten a judge. The judge at common law decides points of law, and enables the jury rightly to decide questions of fact, while in equity he decides both classes of questions. The common law judges are bound to attend and advise the House of Lords whenever called on. A judge cannot be prosecuted for the consequences of his decisions, except in the case where he may have acted without jurisdiction, nor can he officiate in a case where he has a personal interest. The Court of Justiciary, the supreme criminal jurisdiction in Scotland, consists of the lord justice-general, the lord justice-clerk, and five of the judges of the Court of Session, termed commissioners of justiciary. The supreme civil court consists of the Lord President of the Court of Session and twelve ordinary judges, of whom the lord justice-clerk is one. The term is applied in Scotland to all judges, superior and inferior, whose jurisdiction is fixed and determinate, to distinguish them from commissioners, whose judicial authority is only occasional and temporary. With the exception of burgh magistrates and justices of the peace judges receive stated and regular salaries.

JUDGE ADVOCATE-GENERAL, an officer appointed by letters patent under the great seal to preside at the proceedings of courts-martial, under the Mutiny Act and Articles of War, and also to advise the commander-in-chief and secretary of state for war in legal matters. The proceedings of all courts-martial at home and abroad are transmitted to the judge advocate-general by the officiating judge advocate, and are laid before the crown, with a statement of any circumstances which may affect the legality of the decision. The duties of the officiating judge advocate in a court-martial in the navy are nearly the same as those of the presiding judge in a military court-martial. The judge advocate-general, who must be a member of the House of Commons

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and of the ministry, has a salary of £2000. As his tenure of office depends on the continuance in power of the political party he belongs to, he is provided with a deputy whose office is permanent. And as an intimate acquaintance with the general law of the land, as well as with the principles and details of military law, are essential to the proper discharge of the duties of the judge advocate-general, his deputy is always a barrister of eminence. The *deputy judge-advocate*, who acts as public prosecutor in every court-martial, fulfils for a particular court the functions which the judge advocate-general does for the whole army. He administers the oaths to the members of court and to the witnesses, minutes the proceedings, advises the court on points of law, custom, and form, and assists the prisoner by eliciting a full statement of the facts material to the defence.

JUDGES, in Hebrew history. See JEWS.

JUDGES, BOOK OF, a canonical book of the Old Testament, so called because the greater part of the narrative is occupied with the history of the judges who were raised up to deliver their countrymen from the oppressions of their neighbours. The book of Ruth formed originally a part of the book of Judges, which falls naturally into two portions—the first, chap. i.–xvi. inclusive, being almost entirely a history of the wars of deliverance, the early portion of which forms a continuation of Josh. xii.; and the second, chap. xvii.–xxi., which has no formal connection with the preceding, and has been sometimes called an appendix. The general scope of the work is stated in chap. ii. 16–19; but as the people were not everywhere under precisely the same circumstances, the details of their collective history assume varying aspects. We have, therefore, only a fragmentary history of the times, and as might be expected there is occasionally some obscurity from want of full information. Whoever composed or redacted the book must have had available materials at hand in a definite shape, as the song of Deborah (ch. v.), and Jotham's parable (chap. ix. 7–20); but to what extent the rest of his materials were already written is uncertain. It was probably not originally an independent book, and the supposition of Ewald that the books from Judges to 2 Kings form one work is now generally accepted. This accounts for the exclusion from the book, in its separate state, of the histories of Eli and Samuel, from their intimate connection with the rise of the monarchy. Much discussion has been held as to the date when the book assumed its present shape, but the settlement of the question is of little practical value. The chronology has been, and probably will always continue to be, a vexed question, as adequate materials for its settlement do not exist, at least in a form that will secure an agreement in the interpretation of commentators. For though the book offers what appears to be a consecutive series of numbers, doubts have been raised whether the numbers are properly consecutive, and there seem to be important gaps at the beginning and end. The additional data that have been called in to aid the solution of the difficulty present themselves subject of further disputation. The book is admirably simple and original.

JUDGMENT, in English law, is applied to the judicial determination and decision of a court in an action, and is either interlocutory or final. In the former case it does not finally determine or complete the action; in the latter it does, by an award of redress to one party, or discharge of the other. The several species of judgments that most usually occur in practice are numerous, and of these the judgment in *criminal* cases, unless matter be offered in arrest, follows upon conviction, as it is the pronouncing of that punishment which is expressly ordained by law. In the courts of equity a judgment is generally termed a decree or order, and in criminal and admiralty courts a sentence. If the judgment be not appealed against within a certain fixed time it cannot be reviewed, and becomes binding on both parties. In an action for debt, where the debtor refuses payment, to make the judgment effectual the creditor must have recourse to a further process called execution. In Scotland the judgments of the different courts, except where it is otherwise provided by statute, are subject to the revision of a superior judicature. This, however, does not apply to the judgments pronounced by the Court of Justiciary. The Court of Session may review the judgments of the inferior courts, and its own judgments are subject to the review of the House of Lords. In Scotland the term judgment is seldom used, *decree* being usually employed to express the decision of a court, and a decree in absence is equivalent to judgment by default.

JUDICA, the fifth Sunday after Lent; so called because the primitive church began the service on that day with the words *Judica me, Domine* (Ps. xliii. 1).

JUDICIAL SEPARATION is applied in English law to that proceeding in the Divorce Court which has taken the place of a divorce *a mensâ et thoro*. (See DIVORCE.) This substitution was effected by s. 6, 7 of the Divorce Act, 20 and 21 Vict. cap. lxxv. A judicial separation may be obtained, either by the husband or the wife, on the ground of adultery, cruelty, or desertion without cause for two years and upwards. Married persons may live apart if they choose, and may draw up a deed of separation to that effect, which in equity is to some extent recognized as valid; but the law still regards them as married persons, and they can only sue and be sued as such. A judicial separation, however, has a very different effect. With respect to property the wife is placed by it in the position of a *feme sole* from the date of the sentence, during the continuance of the separation, and if she die intestate her property is dealt with as if her husband were dead. She is also considered as a *feme sole* for the purposes of contracts, wrongs, and injuries, and suing and being sued in any civil proceeding. On the other hand her husband is in no way liable for her contracts or torts; but if he has been ordered by the court to pay her alimony, he will be liable for necessaries supplied to her if he have failed to pay her alimony. Of course, since the parties are not divorced, neither of them can marry again during the life of the other. The Conjugal Rights Act, 24 and 25 Vict. cap. lxxvi., has done much to assimilate the Scotch and English law in these respects; for when the wife in Scotland has obtained a decree of separation *a mensâ et thoro*, all the property which she may acquire or inherit is at her own absolute disposal, as much as if her husband were dead. She can also enter into contracts, and sue and be sued in her own name; but her husband is freed from all responsibility as to her debts and necessaries, as long as he pays the aliment secured to her by the decree of separation.

JUDITH, widow of Manasses, a Jewish heroine of great beauty, virtue, courage, and piety, whose history is given in the book which bears her name, the author and age of which are unknown. The Catholic Church admits it into the canon, but it has been generally considered apocryphal by Protestants. Judith, it is well known, is represented as going out to the tent of Holofernes, an Assyrian general who was besieging Bethulia, charming him with her beauty, and taking advantage of the admission to his tent, thus afforded her, to cut off his head with his own sword while he slept. Some writers have given an allegorical interpretation to this history, Jerome

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seeing in her exploit the image of the victory of the church over the power of evil.

JUGGERNAUTH (*Jagannâtha*, 'lord of the world,' one of the names of Vishnu), called by the natives *Puri*, a town and celebrated temple of Hindustan, in the presidency of Bengal, province of Orissa, on the Bay of Bengal, 48 miles south of Kattack. The town derives all its importance from the temple. This, the most celebrated shrine in Hindustan, was completed in the twelfth century, at an enormous expense. The main street, at the extremity of which the temple stands, consists entirely of religious structures built of stone, with plantations of trees interspersed, and has an imposing and picturesque appearance; but it is filthy in the extreme, and swarming with religious mendicants. The gardens here produce the finest fruit in the province. From the salubrity of its climate Juggernauth has been called by Europeans the 'Montpellier of the East.' The temple stands near the shore, in a waste, sandy tract, and appears like a shapeless mass of stone. The idol is a carved block of wood, with a hideous face, painted black, and a distended blood-red mouth, and is magnificently dressed. On festival days the throne of the image is placed on a tower 60 feet high, moving on wheels. Six long ropes are attached to the tower, by which the people draw it along. The priests and their attendants stand round the throne, and it used formerly to be the custom for enthusiastic devotees to cast themselves headlong in front of this car to be crushed to death amid the shouts of the multitude, but of late years this barbarous practice has been checked, and such self-immolations are now rare. Every year, particularly at two great festivals, in March and July, the pilgrims flock in crowds to the temple. Many old persons undertake the pilgrimage that they may die on the holy ground. The contributions of the pilgrims, which amounted to a considerable revenue (about £12,000 per annum), at one time fell to the government, after deducting the expenses of the temple. The English took possession of the province in 1803, and forbore to exact the contribution of the pilgrims during the Marquis of Wellesley's administration; but on his departure from India the Bengal government passed an ordinance for the management of the pagoda and the taxing of the pilgrims. This state of matters continued till 1839, when, under the administration of Lord Auckland, the tax on pilgrims was abolished, and a yearly sum appointed to be paid by government to the custodiers of the temple for its maintenance. More recently the Indian government has withdrawn itself from all connection with the worship of Juggernauth, by commuting the yearly grant for a direct compensation in money and lands. Pop. 22,695.

JUGGLERS, men who perform, in public, tricks of legerdemain. In the middle ages the name of *jongleurs* was given to the instrument-players who accompanied the troubadours. Afterwards these performers employed themselves in tricks and games, which, if Ducange's derivation of *jongleur* from *jocularis* or *joculator* is correct, must have been their original occupation. They accompanied with dramatic action the songs which they helped to sing; they were buffoons, and united in bands, which had many privileges. They formed in Paris a society, the members of which dwelt together in the Rue des Jongleurs, afterwards St. Julien des Ménétriers. Those whom we now call *jugglers*, men of wonderful activity and skilful equilibrists, were then distinguished by the name of *bateleurs* or *batalores*. Juggling tricks seem to have been practised in the East from the earliest times. Raised to an art by the Hindus, these tricks became a profession, which is still exercised in its highest perfection in China, on the coasts of Coromandel, and in both peninsulas on this side and beyond the Ganges. In ancient times there were wonderful exhibitions of this kind. Swallowing the sword, and catching several knives thrown quickly into the air, were often performed before the ancients. The general appellation among the Romans of these conjurors or wonder-workers was *præstigiatores*. Those who threw the knives were called *ventilatores*, and those who threw balls and rings in a perpetual circle are mentioned by Quintilian under the name of *pilarii*. The two arts, which are still united in India, that of divination and of exhibitions of bodily address and agility, were both practised by those ancient artists, hence they attracted the attention of the early Christian fathers, whose accounts of them are still read with interest. Many penal laws were enacted by the Scotch Parliaments against jugglers, who were included amongst vagabonds and Egyptians and other descriptions of idle and disorderly persons.

JUGURTHA, the son of Manastabal, a son of Masinissa, by a concubine. Micipsa, his father's brother, and king of Numidia after Masinissa (B.C. 149), adopted him, and brought him up with his own sons, Adherbal and Hiempsal. He was of a fine person, endowed by nature with superior talents, and he early formed himself for a soldier. Micipsa, who began to fear him, sent him with an army to assist the Romans against Numantia; but as he won the friendship of Scipio, Micipsa sought to conciliate him by favours. He adopted him, and declared him joint heir to the crown with his two sons, whom, on his death-bed, he commended to his care. Jugurtha, who had resolved to become sole master of Numidia, soon after the death of Micipsa caused Hiempsal to be murdered, and drove Adherbal from the country. Hearing that Adherbal had gone to Rome, he also sent ambassadors there, to counteract by bribes the effect of his representations. The greater part of the senate declared in his favour, and ten commissioners were named to divide Numidia between Adherbal and Jugurtha, who allotted to Jugurtha the richest provinces. To draw Adherbal into a war he made an attack upon his territory, and obliged him to take up arms in self-defence. Adherbal was defeated, and his army destroyed. He fled to the strong fortress of Cirta, where he was immediately besieged. He found an opportunity, however, to make known his unhappy situation at Rome; but Jugurtha's friends prevented anything being done except the sending of commissioners, whose mission was of no avail. In the meanwhile the siege of Cirta was pressed with vigour. Adherbal was forced to surrender, and Jugurtha caused him and all his followers to be put to death. This atrocity was followed by a declaration of war on the part of Rome, and the chief command was given to the Consul Lucius Calpurnius Bestia, who at first carried on the war with zeal, and conquered several cities; but he soon after entered into a negotiation with Jugurtha, and as he had not been sparing of his money, granted him very favourable conditions. Much discontent was shown at Rome, and Jugurtha was obliged to stand before the tribunal of the Roman people, but the assembly dispersed without deciding anything. Jugurtha now caused the assassination of Massiva, an illegitimate son of Gulussa, brother of Micipsa, to whom the Roman people were inclined to award the crown of Numidia, but as a safe-conduct had been promised him he merely received orders to quit the city immediately. War was again declared against him, and carried on by the Consul Posthumius Albinus; but on the departure of the consul to hold the comitia at Rome he defeated his brother, Aulus Posthumius, and made his army pass under the yoke. The senate sent Metellus to Numidia. He conquered

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Jugurtha in a great battle, and remained firm against all his bribes. Marius had caused the recall of Metellus, and his own appointment in his place; but before he left Rome Jugurtha had narrowly escaped falling into the hands of the Romans by the treachery of one of his servants, Bomilcar. Again beaten by Metellus, he resolved to ask for the assistance of the Getulians, and of Bocchus, king of Mauritania. He obtained it, and at the head of a new army attempted to reconquer his kingdom. In the meanwhile Marius had arrived in Africa to supersede Metellus, and after various vicissitudes of fortune he succeeded in totally routing the combined armies, amounting to nearly 90,000 men, though Jugurtha himself fought with extraordinary bravery. The King of Mauritania now concluded a peace with the Romans, and abandoned his ally. Sulla, the quæstor of Marius, persuaded him to draw Jugurtha into his power and deliver him to the Romans. Under pretence of mediating between the contending parties Bocchus enticed him to his court, where he was seized and delivered to Sulla, who sent him in chains to Marius at Cirta (B.C. 106). Thus the war was ended, and Numidia became a Roman province. Marius adorned his triumph with his prisoner Jugurtha and his two sons (B.C. 104). After he had suffered many insults from the people he was thrown into a dungeon, where he was starved to death. His two sons remained captive at Venusia. Sallust has written an account of this war in a masterly style.

JUJUBE (*Zizyphus*), natural order Rhamnaceæ, a spiny and deciduous shrub or small tree, a native of Syria, whence it was introduced into Europe. The fruit is blood-red or saffron-coloured, having a sweet granular pulp. The tree is cultivated for its fruit in many parts of Europe, where it is called the jujube. The species are numerous, and of several the fruit is wholesome and pleasant to eat, as in the case of the *Z. vulgaris* and *Jujuba*, the *Z. Œnoplia*, and *Z. Joazeiro*, whose drupes are used in Brazil as jujubes. The fruit of the common jujube is dried, and forms an article of commerce; and in Italy and Spain is used at table in desserts, during the winter season, as a dry sweetmeat. It is equally in repute in Constantinople, and has long been imported from Turkey into the west of Europe. The jujube flowers in August and September, and grows to a height of 20 feet. *Z. Lotus*, which gave its name to the ancient Lotophagi, a shrub 2 or 3 feet high, is a native of Persia and the north of Africa. Its berries, which are about as large as a sloe, are to this day collected for food by the Arabs of Barbary. They are made into cakes resembling gingerbread, and a kind of wine is sometimes made from them. *Z. Spina Christi*, or Christ's Thorn, is said to have furnished the branches of which our Saviour's crown of thorns was made. The same name, for a similar reason, is given to *Paliurus aculeatus*, which is common in the hedges of Judæa.

JULIA, the only child of Augustus, was his daughter by his second wife, Scribonia, and was born B.C. 39. She possessed pleasing manners, extraordinary beauty, and a cultivated mind. She was first married (B.C. 25) to her cousin, the young Marcellus, the son of Octavia by her first husband. Having soon become a widow she married, in her eighteenth year, Marcus Vipsanius Agrippa, to whom she bore three sons and two daughters. After the death of Agrippa (B.C. 12) he gave her in marriage to Tiberius, mainly at the instance of his mother Livia, Julia's stepmother, that she might secure the succession of her son to the throne. The marriage, however, was not a happy one, and Tiberius, after the death of their infant son at Aquileia, partly, according to Suetonius, in disgust at the licentiousness of his wife, went into voluntary exile. Meanwhile Augustus had somewhat tardily discovered the misconduct of his daughter, which was a matter known and talked of by the populace of Rome, and in the most violent anger he determined at first to have her executed, but afterwards consented to banish her to Pandataria, a desolate island on the coast of Campania, where her mother, Scribonia, accompanied her. Her licentiousness has been only too clearly established, but that she engaged in a conspiracy against her father's life has not been satisfactorily proved. Augustus may have believed it, for he would never forgive her, notwithstanding the earnest supplication of the people. At last, however, he was prevailed upon to permit her to leave the island for the city of Rhegium, on the Continent. She never dared to return to Rome. After the death of the emperor she suffered still more. As long as Augustus had lived Tiberius had always professed much tenderness for her, and had often begged him to pardon her; but now he treated her with the greatest cruelty. Before she could not leave the city of Rhegium; Tiberius now confined her to her house. He even took from her the little pension which Augustus had allowed her; and she died in the fifteenth year of her exile, in poverty and distress. Her son Agrippa had been put to death by Tiberius shortly before.

JULIAN, Flavius Claudius Julianus, a Roman emperor, whom ecclesiastical writers have surnamed the *Apostate*, son of Julius Constans (brother of Constantine the Great), was born at Constantinople 17th November, 331. When hardly six years old his father and several members of his family were murdered by the soldiers of his cousin the Emperor Constans II. He and his younger brother Gallus having narrowly escaped death were brought up in the Christian religion, which was yet a new one at the court of the emperor. Julian had felt deeply the persecution of his family, and the constraint and fear in which he was obliged to pass his youth. He therefore sought consolation in the study of philosophy and belles-lettres, and at the age of twenty-four he went to Athens, where he was induced to reject the religion of those who had massacred his family and to embrace Paganism. Constans, who feared an attack of the Germans upon the provinces of the Roman Empire, was prevailed on by his wife Eusebia to give to Julian the command of an army against them. He was proclaimed Cæsar at Milan in 355, and proceeded with a small body of troops to Gaul, which was laid waste by the Germans. After he had passed the winter in preparations for the ensuing war he marched against the Germans, took several cities, conquered them in various engagements, and in a great battle near Argentoratum, now Strasburg, completely defeated seven of their princes, and entirely delivered Gaul. He pursued the Germans beyond the Rhine, and conquered them in their own country. As a governor also he displayed extraordinary talents. He gave to Gaul a new constitution. He settled the finances, diminished the taxes, and put an end to the abuses which had crept into the courts of justice. The jealousy of the suspicious emperor could not fail to be excited by the brilliant career of his young kinsman in Gaul, who was accused of aiming at independence. He even stirred up secretly the Gauls against him, and recalled his best troops under pretence that he wanted to employ them against the Persians. This order caused a rebellion among the soldiers, who proclaimed their leader Julian emperor in March, 360, in spite of his own resistance. The emperor now sent an army against Julian, who made preparations in his defence. He left Gaul, where he had passed five years, took Sirmium, the capital of Illyria, and besieged Aqui-

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leia. Here he heard of the death of the Emperor Constans. He now passed rapidly through Thrace, and reached Constantinople December 11, 361, where he was immediately proclaimed emperor. He began by putting a stop to many abuses, and limiting the splendour of his court, and was thus able to remit to the people the fifth part of all their taxes. He sought to restore the heathen worship in all its splendour, and on that account opposed Christianity as much as was in his power, without, however, persecuting the Christians themselves. He took from the Christian churches their riches, and divided them among his soldiers. He sought likewise to induce the Christians by flattery or favour to embrace Paganism, and failing in the attempt he laboured to make their condition disagreeable. In the meanwhile he wished to end the war with the Persians. His first campaign against them was successful. He took several cities, and advanced as far as Ctesiphon. Want of means of subsistence obliged him to retreat. June 26, 363, he was mortally wounded, and died the following night, in the thirty-second year of his age. Though much diversity of opinion has, as was to be expected, existed about the character of Julian, no unprejudiced inquirer can hesitate to accord to him the credit of being not only a great monarch but a great man. His apostasy can be accounted for by the circumstances of his education, and the truth is that he was more a philosopher than a theologian. Some of his works have come down to us. Several speeches, letters, and satires, among which the satires on the Cæsars and that on the people of Antioch, called Misopogon, are distinguished for wit and humour. Julian possessed talent, wit, vivacity, ease in writing, and fertility; but he conformed too much to the taste of his age, in which mere declamation took the place of eloquence, antithesis the place of thought, and play on words the place of wit. He wrote also a work against the Christian religion, of which we have yet some extracts.

JULIAN CALENDAR. See CALENDAR and EPOCH.

JÜLICH (French, *Juliers;* anciently *Juliacum*), a town, Rhenish Prussia, in the government, and 17 miles north-east of Aix-la-Chapelle, capital of circle of same name, at the confluence of the Ellbach and Rör, in a fertile plain, surrounded by swamps and stagnant ditches, which make it very unhealthy. It is strongly fortified; has a court of law and several public offices; manufactures of leather, soap, cotton yarn, &c. Coal is worked in the neighbourhood. Jülich is of Roman origin, and has been supposed, though fancifully, to take its name from Julius Cæsar. It was long the capital of an independent duchy, part of which was so fertile in corn that it received the name of the Kornkammer or Granary. Pop. (1880), 5295.

JULIEN, STANISLAS-AIGNAN, the leading Chinese scholar of his day, was born at Orleans 21st September, 1799, manifested at an early age a most extraordinary linguistic faculty, and taught himself Greek, English, Italian, Spanish, Portuguese, and German. In 1823 he commenced the study of Chinese under Abel Rémusat, and made such progress in it that at the end of twelve months he published a Latin translation of the philosopher Mencius. It was brought out at the expense of the Asiatic Society of Paris, and is a master-piece of its kind. Henceforth he devoted his labours mainly to the languages and literature of the far East. Ancient and modern Chinese, Mantchu, the Mongolian tongues, and latterly Sanskrit, were the subjects of exact and profound study. The relations which Buddhism has introduced between China and India made an acquaintance with Sanskrit indispensable for the accurate rendering into French of the travels of Hiouen-Thsang, the Buddhist pilgrim. The numerous Sanskrit terms clothed in a Chinese dress contained in several of his translations opened up an interesting field of inquiry to comparative philologists, as Julien ascertained the law by which these expressions were transferred from Sanskrit to Chinese. He published the result of his researches in a volume entitled Methode pour déchiffrer et transcrire les Mots Sanscrits qui se trouvent dans les Livres Chinois (1861, 8vo). This work, which is a model of critical acumen and clearness, placed its author in the very first rank of scientific grammarians. No department of Chinese literature is unrepresented in his admirable translations—the drama in Hoei-lan-ki; ou l'Histoire du Cercle de Craie (London, 1832, 8vo); tales in Yu-kiao-li; ou les Deux Cousines (1863, two vols. 8vo); and technical treatises in Resumé des Principaux Traités Chinois sur la Culture des Mûriers et l'Éducation des Vers à Soie (1837, 8vo). His principal merit, however, is that his labours have enabled us to understand the religion and the philosophy of the Chinese. In 1832 he succeeded Rémusat as professor of Chinese at the Collége de France; librarian at the Bibliothèque Nationale, 1839; president of the college, 1855; commander of the Legion of Honour, 1863. He died in 1873, in his seventy-fourth year.

JULIERS. See JÜLICH.

JULIUS, the name of three popes, of whom we shall only mention the two last.

JULIUS II. (Giuliano della Rovere), a native of Albizzola, near Savona, originally a fisherman, was elevated by his uncle Sixtus IV. to the rank of a bishop and cardinal, was appointed Papal legate to France, and in 1503 was elected pope. Immediately on his elevation to the pontificate he resumed possession of the duchy of the Romagna, which had been bestowed on Cæsar Borgia by Alexander VI., and although, while cardinal, the friend of the French, he now became their enemy. He planned the complete re-establishment of the Papal sovereignty in its ancient territory, and the extinction of foreign domination and influence in Italy. He excommunicated the Duke of Ferrara, gave Navarre to Spain, besieged Mirandola, commanded his army in person, formed the League of Cambray against Venice, and was altogether warlike in his measures. The King of France and the emperor convened a council at Pisa, before whom he was summoned to appear and explain his conduct; but he did not obey the summons, and called another council in the Lateran, which completely frustrated the designs of Louis. In 1511, October 11, he formed the 'Holy League,' to which Spain, England, and Switzerland were parties. In 1512 he made open war against Louis XII. The French defeated the Papal army near Ravenna, but were soon after driven out of Italy. Julius died 21st February, 1513. He is considered one of the most immoral of the popes, and his conduct certainly was little befitting the head of the Christian Church. But he was a far-sighted and patriotic sovereign, and a liberal and judicious patron of art and literature. To procure means for building St. Peter's he ordered the sale of indulgences, which was one of the immediate causes of the Reformation. Connected with the plan of rebuilding St. Peter's by Bramante was that of embellishing the Vatican; and on Bramante's recommendation Julius II. invited Raphael to Rome in 1508, where he painted a superb suite of apartments called *La Segnatura*. In the ducal gallery at Florence there is a fine portrait of Julius II. by Raphael. See BRAMANTE and RAPHAEL.

JULIUS III. (Giovanni Maria Giocchi), a Roman of low birth, called himself *Del Monte* because his

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family originated from Monte Savino, near Arezzo, in the Florentine territory. He was made cardinal by Paul III. in 1536, took an active part in the Council of Trent as Papal legate, and was the chief cause that it was transferred to Bologna against the will of Charles V. Julius was elected pope in 1550, and in the following year reopened the Council of Trent, which had been suspended for upwards of two years. He received the fugitive Nestorian patriarch Suluca, and endeavoured to effect a union with the Nestorians. He commissioned Cardinal Pole to organize, in conjunction with Mary, the reunion of England with Rome. He died March 23, 1555, his official career having been comparatively uneventful. His private character is sullied with the taints of licentiousness and nepotism.

JULIUS CÆSAR. See CÆSAR.

JULY, the seventh month in our calendar, which in the Roman year bore the name of *Quintilis*, as the fifth in the computation of Romulus, even after Numa had prefixed January and February. Mark Antony effected a change in its name in honour of Julius Cæsar, who was born on the 12th of the month, and thenceforward by a decree of the senate it was called *Julius*. It originally contained thirty-six days. It is said that Romulus reduced them to thirty-one and Numa to thirty. Julius Cæsar fixed the number at thirty-one, which is still retained. The Dog-days are supposed to commence on the 3d of this month.

JUMILLA, a town, Spain, in the province of and 35 miles N.N.W. of Murcia, at the foot of a hill called the Sierra del Castello. Its houses are generally well built, and arranged in streets, which, though not spacious, are paved and clean. It has two handsome churches, one of them adorned with fine frescoes and paintings, some of them said to be by Rubens, and the other with paintings by the first Spanish masters; an old hospital, the chapel of which is now used as a courthouse; and various manufactures. Jumilla is a bishop's see. Pop. 7362.

JUMNA. See JAMNA.

JUMNOUTRI. See JAMNOTRI.

JUMPING HARE (*Pedetes Capensis*), a species of jerboa found in Southern Africa, and so named from its general resemblance to a hare, whilst its jumping mode of progression, necessitated by the elongated nature of the hind legs, have procured for it its specific and popular distinction. See JERBOA.

JUMPING MOUSE (*Meriones Huasonicus*) is found in Labrador and North America generally, but is especially an inhabitant of the fur territories. Like the jumping hare, it is included in the family Dipodidæ or Jerboas, and is one of the smallest of these forms. See JERBOA and Pl. CLXXII.–CLXXIII. fig. 22.

JUNCEÆ, or JUNCACEÆ, the Rush family, an obscure natural order of endogenous plants, with fasciculated or fibrous roots; hollow, grooved, or flat leaves, with parallel veins. They are herbaceous, and natives chiefly of the colder regions of the globe. Notwithstanding the difference of aspect, in most respects they resemble Liliaceæ, differing chiefly in their flowers being glumaceous, that is, thin, dry, and either brown or green in colour. The bottoms of chairs, mats, &c., are sometimes made of some of the species of the genus *Juncus*, and the wicks of rush-lights are formed from the central cellular tissue. There are fourteen known genera, and the species number more than 260. One of the rushes, the hairy wood-rush (*Luzula pilosa*), is figured on Pl. XC.–XCI. See GRASSES.

JUNE, the sixth month in our calendar. The etymology is uncertain. Vossius gives three etymologies of the name—one from *juno;* another from *jungo* (to join), referring to the union between the Romans and Sabines under Romulus and Titus Tatius; a third from *juniores* (the young men), Romulus having been said to have assigned the month of May to the elders, and that of June to the young men, when he divided the people into these two great classes, the former to serve in counsel, the latter in war. The name has also been traced to Junius Brutus, the first consul. It consisted originally of twenty-six days, to which it is said Romulus added four, and Numa took away one. Julius Cæsar again lengthened it to thirty days, and it has ever since remained unaltered.

JUNG, JOHANN HEINRICH, commonly called *Jung Stilling*, was born 12th September, 1740, of poor parents at Imgrund in Nassau, and died 2d April, 1817, at Carlsruhe. In his youth he was apprentice to a tailor. The desire of knowledge which always occupied him made him afterwards attempt to become a schoolmaster. He was unsuccessful, and returned to the tailor's business, from which, however, he was called several times to become a tutor. At last he succeeded in procuring the means of studying medicine in Strasburg, where he lived in intimacy with Goethe, and was afterwards a physician in Elberfeld. He has described himself the greater part of his life; and the celebrated work Heinrich Stilling's Jugend, Jünglingsjahre und Wanderschaft (Berlin, 1777, three vols.), in a new form, under the title Lebensbeschreibung (Berlin, 1806, five vols.), is incomparable. He relates with modesty and simplicity the way in which his life was passed among the classes of people less favoured by exterior gifts of fortune, and his pious and pure heart discloses itself so unaffectedly and involuntarily, and the style is at the same time so excellent, that the work is still a popular German classic. It has a charm of a very peculiar kind, and many readers will sympathize with the author even in those passages of mystical devotion which do not accord with the tone of their own minds. His works of devout mysticism are very numerous. Those best known are his Theobald oder die Schwärmer, Das Heimweh, Der Volkslehrer, &c. Much opposition was excited by his strange work Theorie der Geisterkunde (Nuremberg, 1808), and the Apology for the same (1809), which is connected with his Scenen aus dem Geisterreiche (Frankfort, 1803). Jung made himself known also by his numerous works on medical subjects, the veterinary art, political economy, &c. He was, moreover, one of the most successful operators for the cure of cataract. 'Already has he,' says Matthison in his Letters (Zurich, 1795), 'restored sight to more than 2000 poor blind people, not only gratis, but in many cases with the addition of pecuniary assistance.' Goethe, in his Aus Meinem Leben, gives a fine character of Jung. Jung's collected works in fourteen vols. were published at Stuttgart in 1838.

JUNGFRAU ('Maiden'), a mountain of Switzerland, in the Bernese or Helvetic Alps, on the frontiers between the cantons of Bern and Valais, 6 miles S.S.E. Lauterbrunnen. It is one of the most magnificent mountains in Switzerland and the loftiest calcareous mountain in Europe; height, 13,174 feet. It was first ascended by the brothers Meyer of Aarau in 1804; again by the same persons in 1812; by six peasants from Grindelwald in 1828; and by M. Agassiz of Neufchâtel and Professor Forbes of Edinburgh in 1841. The height of the Jungfrau entitles it to rank as the eighth European mountain. It received its name either from the unsullied purity of the snow with which it is clad, or from the fact that when it received its name no foot had ever trod its summit.

JUNGLE is a term which has been introduced into our language from India, and is used to designate a thicket of bushes and reeds such as frequently occurs in the East Indies, and more especially at the

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foot of the Himálaya, in the broad belt of the Terai or Tarayani, extending westwards from Assam to the banks of the Jamna. This territory forms a low morass, covered with impenetrable thickets of brushwood and reeds, tall grass, bamboos, creepers, and climbers, &c.; the seat of fever and ague, and the habitation of hyænas, lynxes, tigers, leopards, elephants, monkeys, antelopes, herds of deer, snakes, &c. The long grass is set on fire during the dry season to drive out the wild animals, and cattle are sent in to pasture on the new vegetation which quickly springs up. The jungle flora and fauna have many peculiarities, the heat and moisture giving both to plants and animals a tropical character, and thus in a manner extending the region of the tropics nearly to the foot of the Himálaya, and far within the temperate zone.

JUNGLE-FOWL. See FOWL.

JUNIPER (natural order Coniferæ), a genus of plants having a succulent cone, which is familiarly called a berry. The fruit of *Juniperus communis*, the common juniper, yields an oil which possesses a diuretic property, and is used in the preparation of gin. The volatile oil procured from the branches and leaves of *J. Sabina* (Savin) is an active emmenagogue. The wood employed in making cedar pencils is obtained from *J. Bermudiana*, and a less valuable sort from *J. Virginiana* (the red cedar). The empyreumatic oil of *J. oxycedrus* is used in skin diseases under the name of *huile de cade*. The so-called gum juniper is the produce of a coniferous tree named *Callitris quadrivalvis*, of Barbary. The gum is used in making varnishes, and was formerly much employed in making *pounce* for writing, a substance which has long been superseded by the invention of blotting-paper. The Virginian red cedar is frequent throughout the United States of America from near lat. 45° to the point of Florida, and westward as far as the Rocky Mountains. It does not attain large dimensions, ordinarily not exceeding 30 feet in height, but is highly esteemed for the durability and lightness of the wood, which is employed in the upper part of the frames of vessels, for posts, &c., and is also an article of export to Britain. The red cedar in many places appears as the pioneer of the American forest, fixing upon dry and exposed situations, and fostering beneath its shade young trees of various species, till it is finally overtopped by them, and in its turn disappears.

JUNIUS. The Letters of Junius first appeared in Woodfall's Public Advertiser, from which they were copied into most of the other journals of the time. The earliest under this signature bears date January 21, 1769; the last, January 21, 1772. After they were completed they were collected (the collection including also those signed *Philo-Junius*, with the letters of Sir William Draper and those of Horne to Junius), and published by Woodfall, with a dedication to the English nation and a preface by the author. Besides the letters signed *Junius*, others by the same author were published in the same paper under the signatures of *Publicola*, *Atticus*, *Lucius*, *Brutus*, *Nemesis*, *Veteran*, &c., relating to different subjects, but all marked with the same boldness, severity, and passion which characterize the former. These appeared between April 28, 1767, and May 12, 1772, and are given in the younger Woodfall's edition as the Miscellaneous Letters. This edition was published in 1812 in three vols., and included Junius' private letters to Mr. H. S. Woodfall, and a preliminary essay by Dr. J. Mason Good. An enlarged and improved edition was published in Bohn's Standard Library, edited by John Wade, with an essay by the editor in favour of the claims of Sir Philip Francis to the authorship.

Although fully a century has elapsed since the publication of these extraordinary papers, we have as yet no positive proofs to decide the question who was the author. The most prying curiosity and the most industrious ingenuity have been at work to collect circumstantial evidence on this point, and volumes have been written about it; but notwithstanding all the industry that has been devoted to the subject, and all that has been written on it, the authorship of the letters of Junius seems as far from being settled as ever. The names of those with whom he has been identified are legion. The following is a pretty complete list:—Sergeant James Adair, Colonel Isaac Barré, Hugh Macaulay Boyd, Edmund Burke, Bishop John Butler, Lord Camden, Lord Chatham, Lord Chesterfield, J. L. de Lolme, John Dunning (Lord Ashburton), Samuel Dyer, Henry Flood, Dr. Philip Francis, Sir Philip Francis, Edward Gibbon, Richard Glover, Henry Grattan, William Greatrakes, George Grenville, James Grenville, William Gerard Hamilton, James Hollis, Sir William Jones, John Kent, General Charles Lee, Charles Lloyd, Thomas Lord Lyttleton, Lachlan Macleary, the Duke of Portland, Governor Thomas Pownall, Sir Robert Rich, John Roberts, the Rev. Philip Rosenhager, Lord George Germaine (Viscount Sackville), Earl Shelburne, Earl Temple, John Horne Tooke, Horace Walpole, John Wilkes, Alexander Wedderburn (Lord Loughborough), Dr. James Wilmot, and Daniel Wray. Of course it can be easily shown that many of these never could have been the author; and though some of them claimed the honour (we should perhaps rather say the dishonour), their pretensions were never supported by proofs. Perhaps the controversy may never be settled, but towards this end it would be very interesting to know what has become of the copies of his letters which Junius ordered of his publisher on December 17, 1771, in the following terms:—'When the book is finished let me have a sett bound in vellum, gilt, and lettered Junius I. II., as handsomely as you can—the edges gilt. I must also have two setts in blue paper covers.'

A writer in the Edinburgh Review says:—'A simple test ascertains the political connections of Junius: he supported the cause of authority against America with Mr. Grenville, and maintained the highest popular principles on the Middlesex election with the same statesman. No other party but the Grenvilles combined these two opinions.' Junius, we may add, was also in favour of triennial parliaments, and opposed to abolition of the rotten boroughs. It is likewise evident from his language that he was a man of rank and fortune; this appears not only from his tone and manner, but from his express assertions: 'My rank and fortune place me above a common bribe;' and to one of Woodfall's letters concerning the profits arising from the sale of the letters, he replies, 'I am far above all pecuniary views.' Lord Eldon declared in Parliament that, if not a lawyer, he must have written in concert with the ablest lawyers; but the great English lawyer Butler asserts that Junius commits gross inaccuracies in his legal phrases. Several incidental expressions, as well as his general tone, his intimate knowledge of persons and characters, show him to have been a man beyond middle life. He was evidently acquainted not only with the court but with the city (which was less usual in those days); with the history, private intrigues, and secret characters of the great; with the management of the public offices, with the proceedings of Parliament (not then, as since, public); and also with the official underlings, through whom he sometimes condescends to lash their superiors. With this extensive information he

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united a boldness, vehemence, and rancour which, while he spared no one, stopped at nothing, and rendered him an object of terror to those whom he attacked. To use his own language, 'he gathers like a tempest, and all the fury of the elements burst upon them at once.' 'In rancour and venom,' said Burke in the House of Commons, 'the North Briton is as much inferior to him as in strength, wit, and judgment. King, lords, and commons are but the sport of his fury.' Grafton, Bedford, Blackstone, and Mansfield seem to be objects of personal resentment. Chatham and Camden are fiercely attacked in some of his earlier letters, though his tone in respect to them was changed in the latter part of his correspondence. His style is severe, concise, epigrammatic, and polished; his reasoning powerful, his invective unsparing and terrible.

Public suspicion at the time was fixed most strongly on Burke and Sackville; though at a more recent period the opinion that Sir Philip Francis was the author gained the most numerous adherents. Burke was strongly suspected in his day, but he spontaneously denied it; and apart from internal considerations drawn from his temper, style, and turn of thinking, it is sufficient to observe that on several points Burke and Junius were in direct opposition to each other. The former was a friend of Rockingham, the latter of Grenville; on the American policy and triennial parliaments they were at variance; and Burke knew nothing of city politics, with which Junius was so familiar. The authorship has however been claimed for him as recently as 1859 (Symons, William Burke the author of Junius, London, 1859).

The opinion that Sir Philip Francis (died 1818) was Junius, has found many partisans, and was ingeniously supported in Taylor's work—The Identity of Junius with a Celebrated Living Character established. The arguments are drawn principally from external considerations: his absence on a journey to the Continent coincides with an interruption in the letters; his departure for India with a high appointment, with their cessation; his receiving that appointment, without any apparent cause, just after leaving the war office; his station in the war office, with all the details of which Junius is so familiar; his knowledge of speeches not reported; coincidences of thought and expression between passages of the letters and of speeches of Lord Chatham, reports of which had been furnished by Francis, and with his own speeches, made after his return from India; peculiar modes of spelling, and of correcting the press; resemblance of handwriting—are also brought forward to establish the identity. But the internal argument is against the supposition: Francis was but twenty-seven when the first letters were written, and he never displayed before or after any proofs of a capacity or knowledge equal to the compositions of Junius. Notwithstanding this, however, the prevalent opinion—supported by Macaulay—now is, that Sir Philip Francis was the author of these letters. Of Macaulay's five grounds, however, for ascribing the authorship to Sir Philip Francis, two of them are known to be erroneous suppositions.

Another candidate whose claims have considerable weight is Viscount Sackville (at one time Lord George Germaine). Lord Sackville was strongly suspected at the time. Sir William Draper divided his suspicions between him and Burke, but finally fixed them on the former. His rank, fortune, temper, and talents concur to render it probable; the friends and enemies of Sackville and Junius are the same, and their political principles coincide. Sackville's unmerited disgrace is well known; his hostility to the king may have arisen from having been forbidden the court; Mansfield was a crown-officer at the time of his trial; Bedford was a connection and on bad terms with him; Grafton was a witness against him; Granby was second in command at Minden, and concurred in effecting his disgrace; Barrington was the organ of his dismission. This opinion has been maintained in Coventry's Critical Inquiry (London, 1825), and with additional proofs in Junius Unmasked (Boston, America, 1828); but although many striking coincidences have been pointed out, the proof is by no means complete in favour of this hypothesis. In the Posthumous Works of Junius (New York, 1829), with an Inquiry respecting the author, the letters are ascribed to Horne Tooke. Another writer has started the hypothesis that Lord Chatham was Junius (Essay on Junius and his Letters, by B. Waterhouse, 8vo, Boston, 1831); and this theory was also maintained in Junius Lord Chatham, a work published at New York, in 1857, by Wm. Dowe. An ingenious attempt has been made to show that Lord Temple, brother of George Grenville, was the author of these celebrated letters. The fact that Grenville was the favourite of Junius has often been mentioned, and it has also been suspected, for various reasons, that Lord Temple was in some way connected with Junius. Butler (without suspecting Temple) mentions that the letters appeared to be written in a lady's hand, and that Wilkes once received a card from old Lady Temple, in her own hand, which they agreed in thinking resembled the handwriting of the letters. We have already cited a remarkable passage from the Edinburgh Review on the subject of Junius' political connections, and the statement from the Globe seems to point out his family. George Grenville has himself been suspected to be Junius; but it is sufficient to observe that he died in 1770, when but a small part of the letters had appeared. The attempt above referred to to father the authorship on Lord Temple, is made in a work by Mr. Newhall of Salem, in Massachusetts (Letters on Junius, Boston, 1831), on the ground of the well-established facts, that his political and personal connections were the same; that the opinions of Junius in regard to Chatham and some other persons differed at different times; that this difference agrees with the changes in Lord Temple's feelings towards those individuals; and that the political principles of the two coincide. He also endeavours to show that Temple's talents, age, circumstances, style of writing and thinking, of which he gives specimens, render his hypothesis probable; and we would add, that, if it is not the true one, it is certainly embarrassed with fewer difficulties than any which has come to our knowledge; but *Non nostrum tantas componere lites.* Among the most recent works on the authorship of Junius is The Handwriting of Junius professionally investigated by Mr. Charles Chabot, Expert; with preface and collateral evidence by the Hon. Edward Twistleton (London, 1871). It supports the claims of Francis, but its reasoning and proofs are not at all conclusive.

JUNKS, large flat-bottomed vessels, from 100 to 150 tons burden, used by the Chinese. They have three masts, and a short bowsprit placed on the starboard bow. The masts are supported by two or three shrouds, which, at times, are all carried on the windward side. On the fore and main mast is a sort of lug-sail, of cane or bamboo. Similar to these junks are the Japanese barks, which are 80 or 90 feet long on one deck, but have only one mast, that carries a square-sail, and forward one or two jibs, made of cotton. The Japanese junk is much superior to the Chinese.

JUNO, the queen of heaven, the female Jupiter. The Romans identified this goddess with the Greek Hera. As queen of heaven she bore the surname of *Regina*, and the Romans dedicated a temple to her

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on the Aventine. She was regarded as the special protectress of whatever was connected with marriage, and females from birth to death had her as a tutelary genius. Both as virgins and matrons she was their protectress, and hence she was named *Virginalis* and *Matrona*. She was also surnamed *Natalis*, and women on their birth-day offered her sacrifices. Her great festival, however, was the *Matronalia*, which occurred on the 1st of March. She had the power of conferring fecundity. She had a temple on the Capitoline, under the name of *Moneta*, whence *mint*, where money was coined. As Juno presided over marriage she was called *Juga* or *Jugalis* (connected with *jungere*, to join). Newly married people invoked her under such names as *Domiduca* (she who leads home), *Pronuba* (she who presides over marriage), &c. She presided not only over marriage, but over its sanctity, and by a law of Numa no prostitute was allowed to touch her altar. As *Juno Lucina* she was invoked by women in childbed to assist them, and hence she has been confounded with the Greek Artemis or Eileithyia. As she was surnamed *Curiatia* or *Populonia*, it may be inferred that public as well as private affairs were not beyond her province. In their representations of Juno the Roman artists have commonly adopted the type of the Greek Hera. In Etruria, at Falerii, Lanuvium, Aricia, Tibur, and Prænestе, her worship was popular.

JUNOT, Andoche, Duke of Abrantes, born at Bussy-les-Forges, in the department of Côte d'Or, in 1771, was intended for the bar, but on the outbreak of the revolution joined a volunteer battalion, and soon attracted notice. His fiery valour obtained for him the soubriquet of *The Tempest* (*La Tempête*) from his comrades. At the siege of Toulon, in 1793, he became secretary to Napoleon, who afterwards took him with him into Italy and Egypt in the capacity of aide-de-camp. In Egypt he was advanced to the rank of general of brigade. In 1800 he was made commandant of Paris, and shortly after, on joining the grand army at Boulogne, obtained the command of one of its divisions. He particularly distinguished himself by his bravery at the battle of Austerlitz (December 2, 1805). In 1807 he was sent with an army into Portugal, and by the supineness of the Portuguese made his entry without opposition into Lisbon. His success was rewarded with the title of Duke of Abrantes. Shortly after, on the arrival of the British, his military talents were put to the test, and he soon proved that, however great his personal courage might be, he had none of the qualities necessary to form a commander. Not only did he rouse the indignation of the inhabitants by his wholesale spoliations, but he first allowed himself to be defeated at Vimeira, and was then obliged to submit to the humiliating convention of Cintra. On his return Napoleon received him with the greatest coldness, and he remained long in disgrace. During the war with Austria in 1809 he obtained the command of a corps; and in 1810 was sent into Spain, where he acted under Massena, and did nothing to retrieve his reputation. In 1812 he was appointed to the command of a division of the grand army, and took part in the Russian campaign, during which he completed his disgrace by indecision and want of energy. He was in consequence relegated to the governorship of the Illyrian provinces. In 1813 he became insane, and lost his life in consequence of injuries inflicted on himself by leaping from a window of his father's house at Montbard, where he had been removed.

JUNTA (Spanish, an assembly), in Spain, a high council of state. There were formerly but two of the royal juntas of commerce, the mint and the mines, and the board of the tobacco monopoly. It was originally applied to an irregularly summoned assembly of the states, as distinguished from the Cortes or parliament regularly called together by the authority of the king. Sometimes the term was applied, however, even to this. Under the Bourbon kings of Spain juntas were assemblies convoked by the king, but rather consultative than legislative in their functions, being limited to giving advice on reforms of the administration. After the abdication of Ferdinand Napoleon summoned an assembly of the notables of Spain to meet at Bayonne, and this also was called a junta. In 1868, after the fall of Queen Isabella, a number of juntas formed themselves in the principal towns of the kingdom (Burgos, Cordova, Barcelona, Madrid, &c.), and took on themselves the government, but they were soon dissolved after a central government had been established at Madrid to take the place of that which had been overthrown.

JUPATI PALM (*Raphia tædigera*), a tree inhabiting exclusively the tide-flooded lands of the lower Amazon and Pará rivers, remarkable for its leaves, probably the largest in the vegetable kingdom. The trunk is only 6 or 8 feet high, and 1 foot in diameter. The leaves rise nearly vertically from the trunk, bending out on every side in graceful curves, forming a magnificent plume 70 feet in height and 40 in diameter. Leaves have been cut down and measured 48 and 50 feet long, and even these are not the largest. The leaf-stalk is often 12 or 15 feet long below the first segments of the leaf, and 4 or 5 inches in diameter, perfectly straight and cylindrical, and when dried light and strong as the quill of a bird. The Indians split it into laths for a variety of purposes—window-shutters, boxes, bird-cages, partitions, and even entire houses being constructed of it, with the addition of a few supporting posts at the angles. The fruit, a large oblong drupe, has a bitter oily flesh.

JUPITER, or Juppiter, the supreme deity of the Latin races in ancient Italy. The first part of the name is etymologically the same as the Greek *Zeus*, and the Sanskrit *dyaus* (which means the sky); the second part is of course the same as the Latin *pater*, father. The oblique cases (genitive *Jovis*, dative *Jovi*, &c.) of the noun are formed from the former element alone, and the phrase *sub Jove* is quite classical for in the open air (lit. 'under the sky'). Another form of the name of the god is *Diespiter*, which has precisely the same meaning as Jupiter, *dies* being derived from the same root as *Ju-* or *Jo-* (that is *Dio*), and being no doubt connected with *deus* (the Latin for god) and its Greek equivalent *theos*. The Romans identified Jupiter with the Greek Zeus, and thus the attributes of the two deities have been confounded together in such a manner that they are often treated as exactly identical, the myths which properly belong to the Greek Zeus having been applied to the Roman Jupiter. For some account of these myths and of the distinctive attributes of the Greek god we refer to the article Zeus, restricting ourselves here to the Italian (and more particularly Roman) ideas of Jupiter. Before leaving the subject of the meaning of the name Jupiter it may be remarked that it corresponds in sense with Lucetius and Lucerius (derived from *lux*, light), which were other names given to Jupiter in some parts of Italy, and the former of which is mentioned by Servius as being more especially Oscan.

As the supreme deity Jupiter received from the Romans the title of *optimus maximus* (best greatest), and as the deity presiding over the sky he was considered as the originator of all the changes that took place in the sky. From him accordingly proceeded rain, hail, and the thunderbolt, and he it was that restored serenity to the sky after it had been obscured

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by clouds. Hence the epithets of Pluvius, Fulgurator, Tonitrualis, Tonans, Fulminator, Serenator, &c., were applied to him. As being the tutelary god of Rome he bore the epithets of Capitolinus and Tarpeius (from the Capitoline hill and the Tarpeian rock), and as furnishing assistance to the Romans in their warlike enterprises he was variously styled Imperator, Victor, Invictus, Stator, Opitulus, Feretrius, Prædator, Triumphator, &c., and temples were erected to him under all these epithets. The temple of Jupiter Stator at the Mucian gate and of Jupiter Feretrius were among the oldest which were dedicated to this deity, and are said by Livy and others to be as old as the time of Romulus. The most celebrated of his temples was that on the Capitoline hill dedicated to him as Jupiter Optimus Maximus, jointly with Juno and Minerva. The Capitoline games and the Feriæ Latinæ were held in his honour, the former celebrating him under the title of Jupiter Capitolinus, and the latter under that of Jupiter Latialis. The flint-stone being regarded, according to a wide-spread vulgar error prevalent in ancient Italy as elsewhere, as a thunderbolt (see CELTS), was one of the symbols of Jupiter as the Thunderer. He also bore a sceptre as symbolical of his supreme authority. In concluding treaties both these symbols were taken along with some grass from his temple, and the oath by which the treaties were ratified was said to be taken *per Jovem Lapidem* (by Jupiter Lapis—*lapis* being the Latin for 'a stone'). After the Romans had come to identify Jupiter with Zeus, they adopted for their own deity the Greek representations of the latter. Jupiter was not only regarded as the highest and most powerful among the gods, but also as supreme in human affairs. He foresaw and directed the future, and sacrifices were accordingly offered up to him at the beginning of every undertaking in order to propitiate his favour. Thus the consuls offered up sacrifices to him in the capitol on the day on which they entered upon office. A ram was also sacrificed to him by one of the flamens on the ides of every month, and a similar sacrifice was offered up to him in the regia or ancient palace of Numa Pompilius in the Via Sacra, on the Nundinæ or market-days. Jupiter was also regarded as the guardian of law and order. He maintained the sanctity of an oath, and of the relation between the state and its members. Hence perjurers and traitors were punished by being hurled down from the Tarpeian rock, on which there was a temple consecrated to him. He was likewise believed to be the guardian of property, whether of the state or of individuals, and as such bore the titles of Hercius (from the old word *herctum*, signifying property) and Terminus (the god of boundaries). Rome and all its political subdivisions, gentes, curiæ, &c., as well as the family, were believed to be under the peculiar protection of him and his consort Juno, the queen of heaven. White, the colour of the light of day, was sacred to him. Hence white animals were offered up to him in sacrifice, his priests wore white caps, his chariot was represented as drawn by four white horses, and the consuls were dressed in white on the occasion of the inaugural sacrifice already referred to. With reference to the identification of Jupiter with the Libyan Ammon, see AMMON.

JUPITER, in astronomy, the innermost of the major planets travelling outside the zone of asteroids. He moves round the sun in 4332·5848 of our mean solar days, at the average distance of 475,693,000 miles, his greatest and least distances being 498,604,000 and 452,783,000 miles; his orbit is inclined to the ecliptic at the angle 1° 18′ 40″·3; his distance from the earth varies from 591,569,000 to 403,709,000 miles; he rotates on his axis in a few minutes less than ten hours; the inclination of his axis is very small (3° 4′), so that changes in the seasons must be almost unknown; he is the largest of all the planets, his equatorial diameter appearing to be 85,390 miles, and his polar diameter about $\frac{1}{17}$th less; his volume is 1387 times that of the earth, but his mass is only 300·857 times that of the earth, so that his mean density is only a little greater than that of water. He is very bright; some astronomers say that in reality his surface is never seen, that instead of having a small density, he has a density like that of the earth, and that he is a comparatively small body, with a large cloudy atmosphere such as may have surrounded the earth a long time ago. His belts are dusky streaks parallel to his equator, and seem to be formed by his very rapid rotation (on his equator objects are carried round at the rate of 467 miles per minute, instead of 17 as on the earth), like our trade-winds on the earth; they lie on either side of a white equatorial belt, which sometimes exhibits a rosy tint; outside them, towards the poles, are other more irregular belts more dimly seen. The tints of the belts are of some interest; dark patches in the belts have enabled astronomers to determine the period of rotation of the planet on its axis. Jupiter has four moons, Io, Europa, Ganymede, and Callisto; they were discovered by Galileo in 1610; they are at average distances of from 267,380 to 1,192,820 miles from the planet; they appear, like our moon, to make one revolution on their axis while passing once round the planet, the time of one revolution being from 1 day 18 hours 27 minutes, to 16 days 16 hours 32 minutes. Europa, the smallest, has a diameter of 2099 miles, Ganymede, the largest, has a diameter of 3436 miles. The moons appear from the earth to move in nearly straight lines from one side of the planet to the other, so that the planes of their orbits are nearly the same as the ecliptic and the orbit of Jupiter; they are eclipsed in the shadow of the planet, and their own shadows may be seen passing over the planet's surface; their appearances in greatest elongation, &c., their eclipses and occultations, their transits and the transits of their shadows, afford an interesting study to amateur telescopists; the observation of their transits and eclipses will afford a good means of determining terrestrial longitude when better tables of Jupiter have been prepared. From observation of the eclipses of Jupiter's satellites Römer discovered that the propagation of light is not instantaneous, and he calculated its velocity. See VELOCITY OF LIGHT.

JURA (*i.e.* deer island), one of the inner Hebrides, Scotland, in the county of Argyle, north-east of Islay, from which it is separated by a narrow strait, 1½ mile wide, having the Gulf and Strait of Corryvrecken at its northern extremity, between it and the island Scarba. Its length from S.W. to N.E. is 36 miles, and its mean breadth 7 miles. The general aspect of the island is exceedingly wild and rugged, presenting, apparently, a continuous mountain ridge, uninterrupted by any visible plain or valley, and rising, at three different points, into lofty conical peaks, called the Paps of Jura; the highest of which attains an elevation of 2700 feet, the other two summits being but a very little lower. On the east side are some singular caves, of spacious dimensions, with dry and level floors, and having lofty and beautifully arched roofs. Quartz, clay-slate, mica, chlorite, and talc slates, are the principal rocks. Trap veins, conspicuous for their size and extent, are also common. The soil of Jura is sandy, and from the wetness of the climate and want of ready drainage, much encumbered with peat. It contains but little land really arable, and is chiefly devoted to the rearing of black cattle, which are exported. Much, however, has been done of late years in the way of turning waste and pasture lands to the best advan-

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tage. Hill-draining is extensively followed out, and large tracts, covered formerly with stunted heath, are now clothed with verdure. The island abounds in game, and still retains its ancient reputation for the size of its red deer. With the other islands it forms the united parish of Jura and Colonsay. Pop. in 1871, 761; in 1881, 77[illegible].

JURA, a department in the east of France, bounded on the N. by Haute-Saône, from which it is separated by the Oignon, N.E. Doubs, E. Switzerland, S. and S.W. Ain, and W. Saône-et-Loire; length, N. to S., 75 miles; greatest breadth, 40 miles; area, 1938 square miles. The surface is very mountainous, being covered in the east by the principal chain of the Jura, and in other directions by its ramifications. The loftiest summits within the department have an average height of above 4000 feet. The whole of the surface belongs to the basin of the Rhone, which drains it chiefly by the Ain and the Oignon. The lakes are numerous, but small. The climate in winter and spring is colder than usual in the same latitude. Mist and rain also are very prevalent. The quantity of arable land is more than one-third of the whole. The vine is an important object of culture, and in the sunnier spots produces a wine of good quality. The pastures are both extensive and rich, and the cattle reared on them, together with their dairy produce, form the chief source of wealth. Sheep are few in number. The minerals include several metals, but the only one so abundant as to be worked to advantage is iron, which is the staple manufacture. Marble and alabaster abound, and there are salt springs in different quarters, from which a good deal of salt is made. The chief exports are wine, brandy, Gruyère cheese, timber, &c. For administrative purposes the department is divided into four arrondissements—Lons-le-Saulnier, the capital; Dôle, Poligny, and St. Claude. Pop. in 1881, 285,263.

JURA, THE (German, *Leberberg*), a chain of mountains in Europe, belonging to the system of the Alps. The name is sometimes confined to the ranges which overhang the Lake of Geneva, on the west and north-west, and proceeding thence in the latter direction terminate at the Rhine. More properly, however, the chain includes all the ramifications which lie north-west of the principal chain, and also all the heights between Switzerland, the Lake of Geneva, the Rhone, the Saône, the Doubs, and the plains of Alsace. According to this view they may be subdivided into six minor chains, stretching S.S.W. to N.N.E. The greatest length of the range is 200 to 220 miles, from Belley in France, department of Ain, to the banks of the Rhine; and the greatest breadth about 63 miles, between the Lake of Geneva and the banks of the Doubs. The part of the Jura nearest the Alps is the loftiest; the height gradually diminishing as it recedes from them. From this circumstance—viewed in connection with the other facts, that the steepest side of the principal chain is in the same direction, and that the subordinate chains have a marked parallelism with that of Mont Blanc and the adjacent mountains—the Jura may be considered as a terrace of the Swiss Alps, with which it was probably united before the excavation of the intervening valley. The principal geological formation is Jura limestone, with green-sand, belonging to the lower cretaceous series. Stalactite caves are numerous. The principal lakes, forming a kind of reservoirs of the waters of the Jura, are those of Neufchâtel, Morat, Joux, and St. Point. The valleys are almost all longitudinal, following the N.N.E. direction of the principal chain. The two chief rivers which have their source in the chain are both French—the Ain and the Doubs—and descending from its western slopes, belong to the basin of the Rhone. Seen from the Lake of Geneva the Jura presents a long wall of about 3000 feet. The line is generally unbroken, but occasional prominences start up and form the culminating points. The highest of these are the Reculet, Mont Tendre, the Dôle, and the Grand Colombier; the heights of which are respectively 5641, 5517, 5514, and 5021 feet.

JURASSIC FORMATION, or JURA LIMESTONE, a name given by Humboldt to the groups of rocks which constitute the chain of the Jura, identical with the English oolite. See GEOLOGY.

JURISPRUDENCE, the science of law—that is, the science which professes to show the principles on which rights depend, and the best means for rendering people secure in the enjoyment of their rights. A complete scheme of jurisprudence thus embraces a theory as to the foundation of a right, and a system of laws or suggestions of laws intended to protect all people from having their rights infringed by the aggressions of others or by mistake. Sometimes the word is used in a more special sense, as when we speak of Scotch, English, or Roman jurisprudence, and in that case what is meant is not merely an acquaintance with Scotch, English, or Roman law, but a knowledge of the principles or supposed principles on which these systems are respectively founded. It is not unfrequently applied, without any qualification, to signify the science of Roman law. The chief writers on theoretical jurisprudence in this country are Jeremy Bentham and Mr. Austin.

JURY and JURY TRIALS. The origin of trial by jury is very obscure. Some have pretended to trace the practice up to the Anglo-Saxons, and believe that the system of compurgation, by which a person cleared himself of the guilt of a crime by the oaths of twelve of his neighbours, called compurgators, who swore to his innocence of the offence charged upon him, is the first germ of trial by jury. But this system of compurgation differs from trial by jury in this, that the oaths of the compurgators were not founded on an investigation of the charge carried on by means of the examination of witnesses and sifting of circumstantial evidence, but on their knowledge of the character of the accused person and the circumstances in which he was placed. All that is known is that from the earliest times the Anglo-Saxons and many other Germanic tribes showed a marked preference for the number twelve or some multiple of it in fixing the number of judges or compurgators; that trial by jury is a very old system, being expressly mentioned in the Constitutions of Clarendon in 1164, and that it only gradually developed into its present form. The law with regard to juries and jury trials differs in England and Scotland. In England juries are of three sorts, viz. coroners' juries, grand-juries, and petty juries. Coroners' juries are summoned to make an inquisition into the circumstances of the death of any one who has been slain, or who has died suddenly—that is, in some violent and unnatural manner, or in prison. The inquisition must be made in presence of the body (*super visum corporis*), and at the place where the death happened. If the body is not found, the coroner cannot sit unless a special commission be issued for that purpose. The jury may consist of any number above eleven. The usual number is twenty-three. If the result of the inquisition is that the jury believe that some person is accountable to the law for the death in question they bring in a verdict of murder or manslaughter against such person, whereupon the coroner must commit that person for trial. The concurrence of at least twelve of the jury is necessary in every finding.

The office of the grand-jury is to accuse persons

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supposed to be guilty of an offence. This jury may consist of any number more than eleven and less than twenty-four. A mandate is issued to the sheriff of every county to return to every session of the peace, and every commission of *oyer* and *terminer*, and of general jail delivery, twenty-four good and lawful men of his county to attend the court, inquire into and present all offences committed within the body of the county. It is said that these grand jurors ought to be free-holders, but not to any fixed amount. Their names are returned on a piece of parchment or paper by the sheriff, which is called a *panel*, and as many of them as appear in court are sworn on the grand-jury, not exceeding twenty-three, nor under twelve, so that twelve may constitute a majority. Their oath is, in substance, that they will diligently inquire and true presentment make of all offences committed within the county; that the government's counsel, that of their fellows, and their own they will keep secret; that they will present no man for envy or malice; neither will they leave any one unrepresented from fear, favour, affection, or hope of reward; but that they will present things truly as they come to their knowledge, according to their best understanding. Usually the presiding judge of the court instructs them in the matters which are within their jurisdiction, by delivering to them a charge containing a summary of the offences and other business which may come before them. They then retire to their room, and sit in secret, hearing evidence in favour of the prosecution only, as the main question before them is whether the party accused ought to be put upon his trial to answer the accusation. But they are always bound to act upon legal evidence, and are instructed that they ought not to find an indictment unless upon their oaths they are persuaded, so far as the evidence goes, that the accusation is true. The mode of accusation is by a written statement in solemn form, describing the offence, with all the proper accompaniments of time and circumstances, and certainty of act and person, which is called an *indictment*, or by a mode less formal (which is usually the spontaneous act of the grand-jury) called a *presentment*, and which is afterwards put into solemn form by some proper officer. No indictment or presentment can be made except by the concurrence of at least twelve of the jurors. The grand-jury may accuse upon their own knowledge; but it is generally done upon the testimony of witnesses under oath, and other evidence produced and heard before them. The proceedings of the grand-jury are, in the first instance, at the instigation of the government or other prosecutor, and are *ex parte*, and in secret deliberation. The accused has no knowledge of, nor right to interfere with, their proceedings. If they find the accusation true (which is usually drawn up in form by the public prosecutor) they write upon the indictment the words 'A true bill,' which is signed by the foreman or chief of the grand-jury, and is presented to the court publicly, and in the presence of all the jurors. If the indictment is not proved to the satisfaction of the grand-jury, 'Not a true bill,' or 'Not found,' is written on it by the grand-jury or by their foreman, and it is then, in common parlance, said to be *ignored* (a term derived from the fact that formerly the word *ignoramus*, meaning 'we are ignorant,' was written on the indictment instead of either of the phrases mentioned), and the accusation is dismissed as unfounded. When the grand-jury return an indictment as a true bill (*billa vera*) the indictment is said to be *found*, and the party stands indicted, and may be required to be put upon his trial. When the indictment is not found, or is declared to be not true, the accused, if he is in custody, or has been in any way required to appear at the court and answer to any accusation against him, is entitled to be discharged or dismissed from any further inquiry or attendance before the court. Every public offence may be properly the subject of an indictment, and taken cognizance of by the grand-jury of the county within which it is committed. But there is another mode of proceeding at the common law, at the suit of the king, called an *information*, which is similar to an indictment, except that it is not found by the grand-jury, and is filed, *ex officio*, by the proper officer of the government. An information cannot be filed except in cases of mere misdemeanors, or offences not capital; for, whenever any capital offence is charged against a party, he cannot be put upon his trial unless the accusation be made by the grand-jury by indictment. It has been already stated that the grand-jury is to inquire only into crimes committed in the county for which they sit. And this is regularly true at the common law, for no man was bound to answer for any crime but before his peers in the county and neighbourhood where it was committed. But by sundry statutes, both in England and America, some offences not committed within a county have, to prevent a defect of justice, been made cognizable therein. To enumerate these offences would occupy too large a space. There are proper powers vested in the courts to compel the attendance of grand-jurors; and if any are returned who are not qualified, they may be excluded from the panel; and if an indictment be found by persons not qualified, the accused may except to it on this account.

Petty or petit juries consist of twelve persons, and no more, for the trial of all criminal offences, and of all issues of fact in civil cases at the common law. The jury of attaint, consisting of twenty-four jurors, summoned for the purpose of investigating the justice of a verdict returned by a jury of twelve men, was abolished by 4 Geo. IV. cap. 1. s. 60, 61. A jury may be either common or special. A special jury may be demanded by the plaintiff in any action, and by either plaintiff or defendant in an action of replevin, on due notice being given to the other party in the action. The qualifications of a common juror are settled by 6 Geo. IV. cap. 1. s. 1, as amended by 33 and 34 Vict. cap. lxxvii., by which latter act the qualifications of a special juror are also settled. By the former act it is enacted that every man, unless exempted on account of his rank or calling, shall be qualified for service on a common jury who, being between twenty-one and sixty years of age, shall have within the county in which he resides, in his own name or in trust for him, £10 per annum, above reprises (that is exclusive of burdens), in lands or tenements, or in rents issuing out of such lands or tenements; or who shall have within the same county £20 per annum above reprises in lands or tenements held by lease for 21 years or longer, or for a term of years determinable on any life or lives; or who, being a householder, shall be rated or assessed to the poor-rate or to the inhabited-house duty in Middlesex on a value of not less than £30, or in any other county on a value of not less than £20; or who shall occupy a house containing not less than fifteen windows. In Wales persons may serve on juries who are qualified to the extent of three-fifths of any of the qualifications which are held as sufficient in England. By the second of the two acts above-mentioned aliens domiciled in this country for ten years or more may be jurors if otherwise qualified. Convicts (unless pardoned) and outlaws are disqualified. Act 33 and 34 Vict. cap. lxxvii. also provides that every man whose name shall be on the jurors' book (a list of jurors belonging to a county which is kept in the custody

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of the sheriff and used for one year, beginning with the 1st of January) for any county in England or Wales, or for the county of the city of London, and who shall be legally entitled to be called an esquire, or shall be a person of higher degree, or shall be a banker or merchant, or who shall occupy a private dwelling-house rated or assessed to the poor-rate or to the inhabited-house duty on a value of not less than £100, in a town containing, according to the census next preceding the preparation of the jury list, 20,000 inhabitants and upwards, or on a value of not less than £50 elsewhere, or who shall occupy premises other than a farm rated or assessed as aforesaid on a value of not less than £100, or a farm of not less than £300, shall be qualified and liable to serve as a special juror in the county in which he resides. Peers, judges, ministers of all Christian denominations, as well as of the Jewish persuasion, not practising any secular calling, except that of schoolmaster, practising serjeants, barristers, and other persons connected with the law, apothecaries, officers in the army or navy, &c., are entirely exempt from serving on juries (see the schedule to 33 and 34 Vict. cap. lxxvii.) When any case is to be tried by a jury a precept issues to the sheriff of the proper county, requiring him to select and summon to the court at which the trial is to be had a suitable number of jurors for the trial of the cause; and he accordingly makes return of the names of the jurors on a piece of parchment or paper (thence, as before stated, called a *panel*), who are compellable to attend at the time and place appointed. When it is a civil case, if the sheriff have any interest in the case, or is not impartial, or is related to the parties, the jurors are selected by some other proper officer, and usually by the coroner of the county. If any of the jurors do not appear when the cause comes up for trial, the court may inflict such fine as seems fit. In the case of persons summoned to serve on any of the inferior courts of record in London, or in any other liberty, city, borough, or town, the fine in case of default is not to be more than 40*s.* or less than 20*s.* The jury is selected from those summoned by ballot. If all the jurors do not appear, or any of them are justly objected to and set aside, in virtue of the right of challenge exercised by the parties to a suit (see CHALLENGE), the deficiency may be supplied from among the by-standers having suitable qualifications, which is called taking jurors *de talibus circumstantibus*, from which circumstance the persons thus selected are denominated *talesmen*. The jury being thus full and above objection are sworn, 'well and truly to try the issue between the parties, and a true verdict to give according to the evidence.' After the jurors are sworn they are not allowed to leave the box, without the permission of the court, till the evidence is given; and even when such permission is given any juror leaving the box must have a keeper with him, unless the case be a criminal one in which the prisoner is charged with a misdemeanour or with misdemeanours, when, if the case is prolonged beyond a day, the jury are allowed to go home on engaging not to allow themselves to be spoken to on any subject connected with the trial. When the prisoner is charged with treason or felony the jury are usually allowed to retire only in custody of the sheriff and his officers, who are sworn to keep them together, and not to speak to them with reference to the trial. The jury being sworn, the cause is then tried in open court. The evidence is offered, and the witnesses publicly sworn and examined in the presence of the judges, the counsel on each side, the jury, and all other persons in attendance. The question whether any evidence is competent to be given to the jury is, if any objection is made, decided by the court. If rejected, it is never heard by the jury; if admitted, it is read, or, if given by a witness, he is examined before the jury. The party who calls a witness first examines him, and he is then liable to be cross-examined by the other side; and if any question is asked which either party deems improper, the opinion of the court is taken on it before the witness is allowed to give his answer. So, also, it is in respect to any written evidence or document offered at the trial. And if either party requests it, the judge who presides at the trial makes a note, in writing, of the objection, so that the party may avail himself of it afterwards, upon a motion for a new trial, or by a writ of error, in a suitable manner. Before the evidence is offered the counsel for the party who opens the cause on each side makes a short introduction, stating the case, the points in controversy, and the facts which he expects to prove, so that the jury may more clearly understand the bearing of the evidence as it is produced. After all the evidence is gone through the counsel on each side argue the case to the jury, at large, commenting upon every part of it, and each insisting upon a verdict in his favour. If any questions of law arise (as in most instances they do) the judge is requested and is bound publicly to state his opinion on all the points of law applicable to it. This he ordinarily does in summing up the case after the arguments of the counsel are over; but he may do it before if he chooses. When the arguments are finished the presiding judge addresses the jury, stating to them the questions, recapitulating the evidence, and commenting on it in such a manner as he deems correct, for the purpose of enabling the jury to understand it well, and to apply the law properly to it. In these addresses he often freely expresses his opinion as to the weight of evidence, the sufficiency of the proofs, the force of particular objections, and the comments of the counsel. But it being a principle of law that the jury is to respond as to matters of fact, and the judges as to matters of law (*ad quæstiones facti respondent juratores, ad quæstiones legis respondent judices*), it is always understood that these comments on matters of fact are not binding on the jury, and that they are given solely with a view of enabling the jury to exercise their functions more perfectly, and that the jury are at liberty to disregard them if they please. But, generally speaking, they do receive great weight from the jury, who naturally place confidence in the judges; and therefore, unless the judge obviously exhibits some improprieties or betrays some unjustifiable feeling, they consider him as a friend, aiding and assisting them in their duty; and his addresses being always in public, and open to the criticism of the public, as well as of the profession, it rarely occurs that his conduct is deemed exceptionable. Still the jury have a right to form, and do form, an independent judgment upon matters of fact; and their judgment becomes conclusive. After the judge has finished his summing-up the jury withdraw into a private room, where they are kept together for the purpose of deliberation, until they have all agreed in a verdict (*veredictum*) upon the point in controversy. They are not permitted to have any intercourse with any other persons, and are allowed during their continuance in secret session to have only such food and other necessaries as are indispensable. Indeed, by the old law, they were to be kept without meat, drink, fire, or candle until they were agreed, unless by permission of the court, which soon, however, became almost a matter of course. When they are agreed they come into open court, and their names being called, they deliver in their verdict, which is recorded by the proper officer, who then reads it aloud to the jury, and asks them if they agree to it

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as recorded, to which they publicly assent. If either party doubts it the jurymen are severally asked if they agree, which is called *polling* the jury. Sometimes when the facts are very complicated, or involve questions of law of great difficulty, the jury, instead of finding a general verdict that the issue of fact is for the plaintiff or for the defendant, state all the facts at large and ask the court to decide upon those facts, whether the issue ought to be found for the plaintiff or for the defendant. This is called a special verdict. It rarely occurs in criminal cases, and is not very common in civil cases. But the jury are never obliged to find a special verdict, and may in all cases give a general verdict if they choose. If the jury, after being kept together for a considerable time, cannot agree, they are usually brought into court by the proper officer, and the court, if their difficulty is about any matter of law, often makes additional explanations. But if, after every reasonable effort, the jury continue to disagree, they are discharged by the court, and the cause must then be tried anew. In criminal cases, seeing that no new trial can be had, and especially in capital cases, it is with great reluctance that the court allows the discharge of a jury after the cause is once committed to them.

In Scotland there is no coroner's jury, and the only case in which a grand-jury is summoned is that of treason, with regard to which the Scotch law has been assimilated to that of England. In all other criminal trials in Scotland the jury consists of fifteen jurors, and a majority is sufficient to convict. In civil cases, for which trial by jury was introduced into Scotland by 55 Geo. III. cap. xlii., the number of jurors is, as in England, twelve, and they must as a rule be unanimous before they give any verdict; but in cases that are tried before the Court of Session in Scotland it is provided by 22 and 23 Vict. cap. vii. (amending 17 and 18 Vict. cap. lix.) that if, after three hours' deliberation, the jury fail to agree upon a verdict, the opinion of nine of them shall be accepted as a sufficient verdict, and that the jury shall not be discharged until after six hours' deliberation. This provision is applicable to exchequer causes. As in England, jurors are either special or common. The qualifications of common jurors, and the manner of enrolling them and choosing them in criminal trials in Scotland, are regulated by act 6 Geo. IV. cap. xxii. First, with regard to the qualifications, it is provided that every man not exempted by his rank or calling is qualified to serve on a common jury, who is between the ages of twenty-one and sixty, and is infeft in his own right or in that of his wife, in heritage, fee, or liferent to the yearly value of at least £5 in the county or city from which the jury is to be drawn, or has movable property of the value of at least £200. A man is qualified to serve as a special juror by paying cess upon £100 or upwards of valued rent, or assessed taxes on a house rented at £30 yearly or upwards (55 Geo. III. cap. xlii.), or by being infeft in lands and heritages in any part of Scotland yielding the sum of £100 or upwards of real yearly rent, or possessing personal property to the amount of at least £1000 (7 Geo. IV. cap. viii.) The ranks and professions whose members are exempted from serving on juries in Scotland are nearly the same as those so exempted in England. Lists both of common jurors and special jurors for each county are kept in the sheriff's office of that county, and the counties of Edinburgh and Lanark are divided into districts, for each of which similar lists are made up. Where the attendance of jurors is required the sheriffs of the counties within the circuit must receive notice from the clerk of the court of the number required, and the sheriffs must then return that number in certain proportions from the different counties. In all criminal trials the number of jurors returned is forty-five, unless the contrary be directed. In civil causes the number of jurors returned must not be less than thirty-six nor more than fifty. For trials held in Edinburgh the sheriffs of Haddington and Linlithgow are required to send in lists of jurors to the sheriff of Edinburgh, who selects in certain proportions from them as well as from the Edinburgh lists the names of the jurors required. When forty-five jurors are required twenty-four are taken from the city of Edinburgh, six from the town of Leith, six from the remainder of the county of Edinburgh, five from the county of Haddington, and four from that of Linlithgow. In criminal trials one-third of the whole forty-five must be special jurors. When a smaller number is required they are taken in the same proportions. In all returns made by sheriffs the names must be taken in regular order from the beginning of the rolls, or from the name next following the last which was taken at the previous return. Any juror who is summoned to attend in court, and fails to appear, is liable to a fine not exceeding £5 and not less than £2, unless a sufficient excuse be given. If a full jury fails to appear, the court may direct the sheriff to add to the list the names of any other persons then in court who are entered in some other list of jurors of the city or county; and any person withdrawing from court after his name has been so added is liable to be fined to the same amount as one who was originally summoned to appear and failed to do so. The names of those who are to serve on any particular jury are determined by ballot. In a criminal trial five jurors may be peremptorily challenged or objected to by each party; the challenge, if made at all, must be made when the name of the juror challenged is drawn from the ballot-box. In a civil trial only four peremptory challenges are allowed to each party. Challenges on stated grounds are not restricted to any number. In trials before a special jury the jury is selected from the number of those returned in the following way. Thirty-six jurors must be returned, and each party strikes off one name from the number alternately, the prosecutor having the precedence, and this is continued until the number is reduced to twenty. When either party fails to attend his place is taken by the clerk of the court. The twenty thus left on the list are summoned to attend in court on the day of trial, and the first twelve of them who appear form the jury. In each case it is left to the prosecutor to determine whether the offence with which the prisoner is charged is of such a character as to require a jury. In the United States the laws as to juries and jury trials are essentially the same as those of England. Twelve men form the jury and the verdict must be unanimous.

Trial by jury was introduced into France in consequence of the revolution of 1789. The laws of 21st August and 22d September, 1790, and 16th September, 1791, regulate the organization and the mode of operation of the French jury, which first exercised its functions in January, 1792. The Constituent Assembly limited the application of the system of jury trial to criminal cases, and established a jury of accusation and jury of judgment, answering to the English grand and petty juries. In 1808 the jury of accusation was abolished, and its place taken by a chamber created in each court of appeal. Since then the law referring to juries in France has been made the subject of frequent modifications, the last of which was on the 21st November, 1872. Under the government of July, 1830, the jurors who had previously been nominated by the prefects were

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chosen by lot from those of the audience in the court whose names were contained in general lists drawn up by the administration. After the revolution of 1848 the number of jurors was considerably augmented, but it was again diminished under the empire by the law of June 4, 1853. The empire also withdrew offences of the press from the consideration of juries. After the fall of the empire the government of national defence again put into force the law of 1848. Since then, by a special law (April, 1871), the national assembly has restored the jurisdiction of juries in offences of the press. The law of November 21, 1872, is due to a reaction against democratic ideas, the influence of which reaction is manifested principally in the composition of the commissions instituted for the purpose of framing definitive jury-lists. In 1848 trial by jury was introduced into Germany, and it is now one of the institutions of the German empire. In August, 1871, it was introduced at Rome.

JURY-MAST, a temporary or occasional mast erected in a ship in the place of one that has been carried away by tempest, battle, &c. Jury-masts are sometimes erected in a new ship to navigate her down a river or to a neighbouring port, where her proper masts are prepared for her.

JUSSIEU, a French family which has produced a number of distinguished botanists, of whom the following are the principal:—

Antoine de Jussieu (born at Lyons 1686; died at Paris 1758) made a botanical tour, and brought from Spain a large collection of plants. After this he wrote upon subjects connected with natural history and medicine. He is the author of the appendix to the Institutiones rei Herbariæ of Tournefort (Lyons, 1719) and of a Discours sur les progrès de la botanique (1781).

Bernard de Jussieu, born at Lyons 1699; died at Paris 1777. While still very young he accompanied his brother on his botanical journeys into Spain and Portugal. In 1720 he received the degree of M.D. at Montpellier, and in 1722 he was appointed sub-demonstrator at the Jardin du Roi at Paris. We are indebted to him for a new edition, in two vols. 12mo, of Tournefort's History of Plants in the Neighbourhood of Paris (Histoire des Plantes qui naissent aux Environs de Paris), published in 1725. He afterwards published, on different plants, a number of monographs, distinguished by great sagacity and acuteness of observation; and long before Trembley he established the animal nature of polyps, which were then regarded as vegetables. For a long period before his death he was employed upon a systematic classification of the vegetable kingdom, based upon the new principle of the natural affinities of plants. During the last years of his life he was blind. Cuvier, in a biographical memoir on Richard, calls Bernard de Jussieu 'the most modest and perhaps the most profound botanist of the eighteenth century, who, although he scarcely published anything, is nevertheless the inspiring genius of modern botanists.'

Antoine Laurent de Jussieu, nephew of the two preceding members of the family, born at Lyons in 1748; died at Paris in 1836. He passed as doctor in 1770, and in the same year was appointed assistant to Lemonnier, professor at the Jardin du Roi. For some time he hesitated between botany and medicine. In 1773, when he was admitted a member of the Academy of Sciences, he published a Mémoire sur la famille des renonculacées, an important work, in which the principles of the natural system of classification are expounded for the first time, and which decided the vocation of the author. When his uncle Bernard became blind he succeeded him in the management of the Jardin botanique. In 1778 he commenced the publication of the work entitled Genera Plantarum secundum Ordines Naturales disposita, which was completed in 1789. This is the first complete exposition of the natural system of classifying plants, which has now taken the place of the artificial Linnæan system. Under the convention he was appointed director of the museum of natural history in the Jardin des Plantes, when he founded the library now so rich in connection with that establishment. He was also appointed professor of rural botany in the same museum. Under the empire Jussieu was appointed professor of materia medica to the Faculty of Medicine at Paris, and councillor for life of the university, but lost these appointments at the restoration. Like his uncle Bernard he became blind towards the close of his career, and in 1826 he resigned his post of professor in the museum of natural history in favour of his son Adrien. Besides the works mentioned above he published a number of short treatises, and also communicated about fifty Memoirs to the Annales du Muséum.

Adrien de Jussieu, son of the preceding, born at Paris in 1797; died there 1853. He first attracted the attention of scientific men by a thesis on the family of the Euphorbiaceæ, which he sustained in the most brilliant manner as part of what was required of him for the degree of Doctor of Medicine in 1824. In 1826 he succeeded his father in the professorship of rural botany in the museum, and in this capacity continued the botanical researches by which his predecessors had already rendered the chair celebrated. At the same time he published a number of works which placed him in the front rank of botanists—in 1825 a Monographie générique des rutacées; in 1830 a Mémoire sur le groupe des méliacées; in 1843 the Monographie des malpighiacées, a work of great value, which had occupied him for fourteen years. In 1840 appeared the first edition of a Traité élémentaire de botanique, published for use in higher-class schools, a work which far excelled all previous works of the kind. In 1831 A. de Jussieu had been admitted a member of the Academy of Sciences, and in 1845 was elected professor of vegetable organography at the Sorbonne, which post he held till his death. A. de Jussieu, in addition to the works mentioned, was the author of a small treatise on botanical classification published in 1848, and a large number of notices and reports communicated to the Annales du Muséum or the Comptes rendus de l'Académie des Sciences.

JUSTE-MILIEU, a French expression, meaning the 'exact middle,' has become familiar to more than one European language, and denotes, though sometimes derisively, the maintenance of a due medium between opposite extremes, more especially on political matters. After the French July revolution of 1830 the term *juste-milieu* became a kind of watchword in the political world when the organs of King Louis Philippe began to insist that the public weal of France could only be secured by government observing a *juste-milieu* or mean between the opposite parties. The word came into general use, and designated, sometimes in a good and sometimes in a bad sense, the political principle of the July monarchy. This government endeavoured, especially in the first years of existence, to bind both extreme parties by amnesties and plausible concessions to the new order of things, but was soon taught by experience that, at least in home politics, this vacillating system does not succeed. Louis Philippe therefore began to incline more and more to the old repression policy, whatever name his ministers might choose to give it; and it may be said with truth that the July throne was at last overturned because the govern-

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ment had entirely lost sight of the principle of maintaining a *juste-milieu*. By the name is now generally understood that undecided and nondescript system of politics which seeks to curry favour with all parties, and thus becomes contemptible and inefficient.

JUSTICE, LORD CHIEF. See CHIEF-JUSTICE OF ENGLAND.

JUSTICE-CLERK, LORD, in Scotland, the presiding judge in the Court of Justiciary, in the absence of the lord justice-general. The person holding the office is always one of the senators of the College of Justice, and Lord-president of the second division of the Court of Session. The office now ranks as the second highest judicial appointment in Scotland. Formerly the justice-clerk appears to have been a mere clerk and assessor of court. (Bell's Dict. of the Law of Scotland.)

JUSTICE-GENERAL, LORD, in Scotland, the president of the Court of Justiciary, whose duties are now performed without salary by the Lord-president of the Court of Session. Formerly the lord justice-general was a separate officer of high rank, but as the office came to be a sinecure, the duties connected with it being almost invariably discharged by the lord justice-clerk, it was abolished by 1 William IV. cap. lxix. s. 18, 19, and its duties were made to devolve upon the officer who now performs them. (Bell's Dict. of the Law of Scotland.)

JUSTICE OF THE PEACE. The word *justice* is applied to judicial magistrates; as *justices* of such a court, and, in English laws, *justices of the forest, hundred, of the labourers*, &c.; and hence the appellation *justice of the peace*, that is, a judicial magistrate intrusted with the conservation of the peace. In Britain the justice of the peace, though not high in rank, is an officer of great importance, as the first judicial proceedings are had before him in regard to arresting persons accused of grave offences; and his jurisdiction extends to trial and adjudication for small offences. In case of the commission of a crime or a breach of the peace a complaint is made to one of these magistrates. If he is satisfied with the evidence of a commission of some offence, the cognizance of which belongs to him, either for the purpose of arresting or for trying the party accused, he issues a warrant directed to a constable, or other executive officer designated by the law for this purpose, ordering the person complained of to be brought before him, and he thereupon tries the party, if the offence be within his jurisdiction, and acquits him or awards punishment. If the offence charged be of a graver character, the adjudication upon which is not within the justice's jurisdiction, the question then is, whether the party complained of is to be imprisoned, or required to give bonds to await his trial before the tribunal having jurisdiction, or is to be discharged; and on these questions the justice decides according to his view of the law and the facts. In Britain there are some officers, as the master of the rolls, some municipal authorities, &c., who are justices of the peace by prescription, in virtue of their other office; but, in general, the appointment is by commission; and in Britain, when a new commission issues to justices in a certain county, this supersedes former commissions for the same county. In America the office is held only by special appointment, and the tenure is different in different states, the office having been held, in one state at least, during good behaviour; but the commission is more usually for seven years, or some other specific limited period. In France justices of the peace (*juges de paix*) are in many respects different from those of Britain and America, though the national convention in its famous decree respecting the new organization of the judicial system (Aug. 24, 1790), which, in its principal features, still exists, evidently contemplated a closer imitation of the British system. They are paid magistrates who decide in a summary manner on a variety of cases of minor importance, whether in connection with property or with offences against the police regulations. They pronounce judgment without appeal on cases in which property to the value of 100 francs is in dispute, assist in bringing about compromises between parties intending to apply to the civil tribunals, &c. There is one for each canton, and they hold at least two sittings a week.

JUSTICES, LORDS, the name given to the officers appointed to take charge of the administration of the kingdom in the absence of the sovereign. There is no constitutional necessity for delegating the royal authority to any officers on such occasions, and during the absences of Queen Victoria it has not been done, but from an early period in the history of the country it has been the usual practice to do so. Since the Revolution such appointments have been made by letters-patent under the great seal, and on some occasions have been confirmed by Parliament. The powers conferred on lords-justices have usually been limited in the case of the chief prerogatives of the crown, such as the pardoning or reprieving of criminals, the summoning or prorogation of Parliament, &c. Lords-justices have also been appointed on several occasions for the government of Ireland during the absence of the lord-lieutenant, or during the interval elapsing between the expiration of office of one lord-lieutenant and the appointment of another.

JUSTICES' CLERK, an officer appointed by justices of the peace in England to assist them in the discharge of their duties. He is usually a solicitor, the advice of a lawyer being frequently required to guide them in the administration of certain branches of the law, and the interpretation of acts of Parliament.

JUSTICES IN EYRE, also called ITINERANT JUSTICES and JUSTICES OF ASSIZE, justices who travel about over fixed circuits dispensing justice. The term *eyre* is a corruption of the Latin *iter*, signifying a journey. Justices in Eyre were first appointed by the Parliament of Northampton in 1176. In the Magna Charta of 1215 provision was made for each county being annually visited by them. By the statute called Westminster II. (13 Edward I. cap. iii. 1285), they were authorized to try civil causes, and by 1 William IV. cap. lxx. July 23, 1830, their jurisdiction was extended to Wales and the county palatine of Chester.

JUSTICIARY COURT, the supreme criminal court in Scotland, consisting of the lord justice-general (who is the president), the lord justice-clerk, and five commissioners of justiciary, who are also lords of session. In this court causes are tried by the verdict of a jury. The judges go on circuit to the principal districts of the country, where they hold courts periodically. There are three of these circuits, south, west, and north. The first comprises the burghs of Jedburgh, Dumfries, and Ayr; the second those of Glasgow, Inverary, and Stirling; and the third those of Dundee, Perth, Aberdeen, and Inverness. There is besides a winter circuit court held at Glasgow during the Christmas recess of the Court of Session. One lord can hold a circuit court, and the judgments of circuit courts are not liable to review in the justiciary court. Upon these circuits they possess a civil jurisdiction, by way of appeal, in causes below £25 sterling; and in these they proceed without a jury.

JUSTIFICATION, a theological term employed to designate the act by which pardon is extended to the sinner the moment he becomes united to the

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Saviour by a living faith. The Romish Church, by making justification to be not an *act*, but a *work*, confounds it with sanctification; but the reformers were always careful to distinguish between the two. So much importance did Luther attach to this distinction, that he regarded the doctrine of justification by faith alone to be one of the most fundamental in the Christian system, and declared it to be, according to the view taken of it, 'Articulum stantis aut cadentis Ecclesiæ.'

JUSTIN (*Justinus*), surnamed the *Martyr*, and occasionally the *Philosopher*, one of the earliest and most learned writers of the Christian Church. He was the son of Priscus, a Greek, and was born at Flavia Neapolis, anciently called *Sichem*, a city of Samaria, in Palestine, towards the close of the first century. He was educated in the Pagan religion, and after studying in Egypt became a Platonist, until, about the year 132, he was led by the instructions of a zealous and able Christian to embrace the religion of the gospel. He subsequently went to Rome in the beginning of the reign of Antoninus Pius, and drew up his first apology for the Christians, then under a severe persecution, in which he shows the cruelty and injustice of the proceedings against them. He was also equally zealous in opposing alleged heretics, and particularly Marcion, against whom he wrote, and published a book. He not long after visited the East, and at Ephesus had a conference with Trypho, a learned Jew, to prove that Jesus was the Messiah, an account of which conference he gives in his Dialogue with Trypho. On his return to Rome he had frequent disputes with Crescens, a Cynic philosopher, in consequence of whose calumnies he published his second Apology, which seems to have been presented to the Emperor Marcus Aurelius in 164. Crescens preferred against him a formal charge of impiety for neglecting the Pagan rites, and he was condemned to be scourged and then beheaded, which sentence was put into execution in 165; several authorities put the date some years later. Justin Martyr is spoken of in high terms of praise by the ancient Christian writers, and was certainly a zealous and able advocate of Christianity, but mixed up too much of his early Platonism with its doctrines. Among the best editions of his works is that of Otto (Jena, 1842–46, three vols.)

JUSTIN (*Justinus*), a Latin historian, who probably lived at Rome in the second or third century, although some assign him a later date. He made an epitome of the History of Trojus Pompeius, a native of Gaul, who lived in the time of Augustus, and whose works, in forty-four books, contain a history of the world from the earliest ages to his own time. His History of Macedonia was particularly complete. To judge from the epitome (for the original is lost) there were many errors in the work, especially in the Jewish history; but this epitome, which corresponds to the original in its title and arrangement, having compressed into a brief space so much of the important matter of the old histories, has obtained a considerable reputation. The style is on the whole elegant and agreeable, but it is destitute of that noble simplicity and classical correctness which distinguish the work of a master.

JUSTIN (*Justinus*), the name of two emperors of the East.—1. JUSTIN I. (born 450 A.D.), a peasant of Dacia, having become a soldier of the guards in the reign of Leo I., acquired so much distinction by his services that he gradually rose to be their commander. Holding this important appointment at the death of the Emperor Anastasius in 518 he was proclaimed his successor, and mounted the imperial throne almost unopposed. Feeling that, from his want of learning, he was incapable of directing the internal civil administration, he resigned this duty to the faithful quæstor Proclus, who discharged his functions to the satisfaction of both the emperor and his subjects. In 523 he resigned to Theodoric, king of Italy, the right of appointing consuls in Rome, and in the same year became involved in a war with Persia. Two years later occurred a terrible earthquake which laid Edessa, Pompeiopolis, Corinth, and Dyrrachium in ruins, and Antioch was completely destroyed by fire and water combined. When Justin heard of these awful disasters he put off his crown, went into mourning, and ordered a supply of money and necessaries for the sufferers. He spent £2,000,000 sterling towards the rebuilding of Antioch alone. He died 1st August, 527, shortly after having conferred the dignity of Augustus upon his nephew and successor, the famous Justinian I.——2. JUSTIN II., raised to the imperial throne on the death of his uncle Justinian I. in 565, had a very troubled reign. At its very outset he came into hostile collision with Narses, the conqueror of the Goths, who in order to strengthen himself invited the Longobards under Alboin to invade Italy. Italy being thus overrun was entirely lost to the Byzantine Empire, while in the East it was in like manner curtailed by the encroachments of the Persians. Internal discord also prevailed; and Justin, convinced of his inability to cope with the difficulties which surrounded him, abdicated in 574 in favour of Tiberius, captain of the guards. His death took place in 578.

JUSTINIAN I. (*Flavius Anicius Justinianus*), surnamed the *Great*, nephew of Justin I., emperor of the East, celebrated as a lawgiver, was born in 483 of an obscure family. He shared the fortunes of his uncle, who, from a common Thracian peasant, was raised to the imperial throne. While consul (521) he exhibited splendid games to the people. He likewise flattered the senate and sought their favour, in consequence of which that body conferred on him the title of *Nobilissimus*. His uncle, infirm from age and suffering from a wound, admitted him to a share of his power. Yet it was not till after his death, August 1, 527, that Justinian was proclaimed emperor. He now married Theodora, whom he raised from the condition of an actress and a public prostitute to the throne of the Cæsars. She acquired an absolute mastery over her husband. Under his reign the parties of the circus contended with great animosity, and under the names of the *Greens* and the *Blues* occasioned many bloody scenes in Constantinople. The violent means which Justinian used to quell the tumult only served to increase it, and a conflagration, which broke out in consequence, laid the greatest part of Constantinople and his own most beautiful buildings in ashes. Justinian's own life was in peril. After the turbulence of these parties was extinguished by streams of blood and a multitude of executions Justinian finished the war with the Isaurians, and his general Belisarius in 523 and 529 obtained three glorious victories over the Persians. This great general destroyed in 534 the empire of the Vandals in Africa, and carried Gelimer their king a prisoner to Constantinople. Spain and Sicily were reconquered, and the Ostrogoths, who possessed Italy, were vanquished. In 536 Belisarius made his entry into Rome, and the eunuch Narses, another of Justinian's generals, in 553 put an end to the dominion of the Ostrogoths in Italy. These successes restored to the Roman Empire a part of its former vast possessions. Justinian now turned his attention to the laws. He commissioned ten learned civilians to form a new code from his own laws and those of his predecessors. To this code Justinian added the Pandects, the Institutes, and Novels. These compilations have since been called collectively

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the body of civil law (*corpus juris civilis*). Justinian was also intent upon building new cities and upon fortifying others, and adorning them with new edifices; but he was particularly desirous of establishing peace in religious matters. Amongst other churches he rebuilt that of St. Sophia at Constantinople, which had been burned in the quarrel of the Greens and Blues. Towards the end of his life he became avaricious—without losing his love of splendour—suspicious, and cruel. He oppressed the people with taxes, and lent a willing ear to every accusation. He suffered his own servants to commit the most flagrant crimes unpunished. He died in 565, in the eighty-third year of his age, after a reign of thirty-eight years. His love of the monks, of saints, and of theological questions did not protect him from the censure of the divines, who esteemed him a heretic. Much that was great and glorious was accomplished during his reign, but he had little share in it.

JUTE, a textile fibre obtained from *Corchorus capsularis*, a plant belonging to the natural order Tiliaceæ. The jute plant is a native of the warmer parts of India, where its cultivation is carried on, especially in Bengal, on an extensive scale. It is an annual plant, growing to a height of 12 or 14 feet. The fibre forms the inner bark of the plant, and possesses in an eminent degree the tenacity common to the bark of the plants of this order. The flowers resemble those of the linden or lime-tree; the seed-vessel is of a nearly globose figure; the leaves are about 4 inches long. The fibre is fine, and has a shining surface; it is injured by exposure to water, and hence is not well adapted for cordage and canvas, but is in extensive use in India for making bags, and in Britain serves many other useful purposes, being often mixed with hemp for cordage, and even with silk in the manufacture of cheap satins, although its principal use is in the manufacture of coarse cloth for bagging and in making the foundation of inferior carpets, mats, &c. In Bengal jute has been cultivated and its fibres woven into various fabrics from a remote period; but it is only since about 1830 that its manufacture has risen to importance in Britain. The headquarters of this branch of industry are at Dundee, which imported 154,341 tons of jute in 1882, the total import into the kingdom that year being 298,892 tons. The rice, cotton, sugar, coffee, pepper, and other articles of East Indian commerce are almost wholly carried in gunny-bags (as the jute bags are called), large quantities of which are made in and exported from Bengal itself. The jute manufactures exported from Great Britain in 1882 were of the value of £2,390,653, besides yarn to the value of £282,257.

JÜTERBOGK, a town of Prussia, in the province of Brandenburg, government of Potsdam, capital of the circle of same name, on the Rohrbach, 39 miles S.S.W. of Berlin. It consists of the town proper, surrounded by walls with three gates, and of three suburbs; contains several churches, in one of which is preserved Tetzel's indulgence box. It has manufactures of woollen and linen cloth, a trade in horses, cattle, and wool, and four annual fairs. Pop. (1880), 6955.

JUTLAND (Danish, *Jylland*), a province of Denmark, surrounded on three sides by the sea—the Skager Rack on the north-west and north, the Kattegat on the east, and the North Sea or German Ocean on the west; on the south by Schleswig. In the north it suddenly narrows to a mere tongue of land, which continues to taper gradually till it terminates in a point; its base in the south is about 70 miles, and its width across the centre, measured on a parallel of latitude, about 106 miles; its greatest length, measured in a slanting direction from its south-west extremity, through the tongue of land already mentioned, is 182 miles; area, 9597 square miles. The east coast has several good harbours and deep openings leading into navigable waters; the west coast possesses scarcely a single harbour or navigable creek, and is bordered almost over its whole extent by a long line of sand-banks and reefs. Geologically the whole province belongs to the upper part of the secondary formation, and is composed of immense beds of chalk or limestone. The climate on the whole is temperate, but variable. One of the most remarkable features of North Jutland is a vast expanse of inland lakes, extending across it from the very edge of the west coast to its outlet on the east. It is comprehended under the general designation of Liim-fiord; but it properly consists of three principal divisions, each of which forms a distinct lake, and of a great number of minor branches, which ramify like network, and often assume the most fantastic shapes. Numerous small streams send their waters into the fiord. Its only outlet is near Aalborg, where it contracts to a narrow neck, which, though still retaining the name of Liim-fiord, is to all intents a river, and the most important river of the province. The other streams are not of much consequence. The principal water-shed is formed by an elevated tract, of considerable width, which extends through the province in a slanting direction from north-east to south-west. Its highest point, the Himmeljberg, is only 550 feet above the level of the sea. It exhibits almost throughout a dreary expanse of moorland waste. The ground slopes gradually from either side of it to the opposite coasts. In the western direction heath and sand continue to prevail, and the soil in general is so barren that nothing but the most laborious and persevering industry enables the husbandman to draw from it profitable returns. The only exception is in the south, where the general barrenness is compensated by a series of low alluvial tracts, generally used as meadows, and covered with luxuriant verdure. Towards the north, on the contrary, the natural barrenness is increased; and the sand, carried about in clouds, is continually making new encroachments. But on the east coast numerous tracts occur, distinguished alike by the calm beauty of their landscapes and the fertility of the soil. The inhabitants of this province are considered to be the most genuine specimens of the old Danish stock, and have preserved both the language and the manners and customs of early times in their greatest purity. Its earlier inhabitants, the Jutes, took part in the expedition of the Saxons to England. Pop. (1880), 868,511.

JUVENAL (Decimus Junius Juvenalis), the Latin satirical poet, was born probably about the year 42 A.D. in Aquinum, a Volscian town. In the unreliable biography prefixed to his works and erroneously ascribed to Suetonius he is said to have been the son or adopted child of a wealthy freedman. It is also stated by some of his biographers that he followed the profession of a pleader; that he did not venture to publish his satires till late in life; that he was the friend of Martial, who addressed to him three of his epigrams. At an advanced age he is said to have been sent to Egypt in command of a cohort of infantry, and died there from vexation and weariness of this honourable exile, which was inflicted upon him as a punishment for satirizing Paris, the favourite actor of the Emperor Domitian. No trust can be placed in this story, however, and the only facts regarding him on which we can rely are, that he flourished towards the end of the first century, and that Aquinum was a favourite residence of his. It is also highly probable from his style that he was a pleader, and it is believed that he was a friend of Martial. The extant works of Juvenal consist of

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sixteen satires, the last a fragment of doubtful genuineness, all composed in heroic hexameters. 'Each satire is a finished rhetorical essay, energetic, glowing, and sonorous.' There is nothing in them that recalls the pleasant mocking humour of Horace, nor the austere misanthropy of Persius. In them we have a fearful picture of the Roman society of that era—corrupt senators, a depraved nobility, unfaithful matrons, and a degraded people, clamorous only for bread and the games of the circus. The editions of his works are very numerous, the best being those of Henninius (Leyden, 1695, 4to), Ruperti (Leipzig, 1801, two vols.), and especially Jahn (Berlin, 1851). Gifford's translation, with a preface and notes, is very valuable. Dryden has rendered the first, third, sixth, tenth, and sixteenth satires in language full of genius and spirit. Johnson's imitations of the third and tenth satires are deservedly celebrated.

JUXON, WILLIAM, born at Chichester in 1582, entered St. John's College, Oxford, and became a student of Gray's Inn, with the view of qualifying for the bar, but afterwards took orders and obtained livings, first in 1609 at Oxford, and then in 1614 at Somerton. In 1621 he succeeded Laud as president of St. John's College; in 1627 was appointed vice-chancellor of the university, and about the same time chaplain in ordinary to Charles I., who gave him the deanery of Worcester. This promotion he owed chiefly to the friendship of Laud, who not only procured for him the see of London in 1633, but also prevailed on the king to appoint him lord high-treasurer in 1635. This situation he resigned in 1641, when, contrary to his advice and earnest entreaty, the king gave the royal assent to Strafford's attainder. His loyalty, however, remained unshaken; and during the king's confinement in the Isle of Wight, and during his trial at Westminster, he remained constantly with him. He had also the melancholy privilege of soothing his last moments, and ministering to him on the scaffold. His fidelity cost him his bishopric, but at the Restoration he was made Archbishop of Canterbury. He reached the advanced age of eighty, and died in 1663. He was of a munificent disposition, and left £7000 to increase the fellowships of his college.

K.

K,[1] the eleventh letter of the English alphabet, representing a guttural articulation, produced by pressing the root of the tongue against the upper part of the mouth behind, with a depression of the lower jaw and opening of the teeth, and differs, in most ancient and modern languages, from *g* hard only by a stronger pressure of the tongue, and a stronger expiration. (See G.) K, by the Greeks called *kappa*, is probably of later origin than G, as its most ancient form on monuments seems to be a contraction of gamma, that is, in its first straight and its second bent form (I C). On the ancient coins of Crotona, Corinth, Syracuse, we find this sign, ϙ, from which the Roman Q originated. In Latin *k* was little used, its place being supplied by *c*. The Greek K was not adopted by the Latins before the time of Sallust, and was only used in words which began with *ca*, as *kaput*, *kalumnia*, *kalumniator:* hence a K was branded on the forehead of calumniators. As an abbreviation, in Latin, it signifies *Kæso* (a name), and several other words, *kalendæ*, &c. The Greek K stands on coins for *Kaisar*, Cæsar; *Klaudios*, Claudius; *Kampania*, Campania, &c. It often also signifies *Carthage*. As an abbreviation it often stands for *kai* and *koinon*, common; *kolonia*, colony, &c. The Greek K′ signifies twenty, and ,K = 20,000. K, in Latin, is equal to 250; with a horizontal dash over it, $\bar{K} = 250{,}000$. It answers to *kaph* or *koph* in Hebrew. The Italians, Spaniards, and Portuguese have banished the letter entirely from their alphabet. The French use it only in words originally German, Breton, foreign proper names, &c. At the beginning of a word or syllable K is not pronounced when followed by N: as *knife*, *knee*, *know*. K, before a vowel, is one of the easiest sounds children learn; but it is difficult if it precedes another consonant.

KAABA, or CAABA, the name of the quadrangular flat-roofed structure in the sacred temple at Mecca; it is about 34 feet high and 27 feet broad. According to Mussulman tradition, the first Kaaba was built by the angels on the model of the pavilion which surrounds the throne in heaven; the second was built by Adam, with whom it was transferred to the skies, where it still exists in a right line above the Kaaba of Mecca; the third was built by Seth, and perished in the deluge; the fourth by Abraham and Isaac. This was restored on several occasions, notably by Mohammed and by Sultan Mustapha in 1630. Part of the original wall is still shown, and looked upon with great veneration. On one of the sides of this cubical oratory is inwrought the famous oval black stone, in a silver setting, the Hadjar-el-Aswad or Kebla, said to have been brought from heaven by Gabriel to Abraham when he was erecting the Kaaba. At first of a dazzling whiteness, it has grieved and wept so long over the sins of the world that it became gradually opaque, and finally black. The Kaaba stands in the centre of a covered-in court, is surrounded on all sides by a black silk curtain, and is opened only three times a year. Immense crowds of hadjis or pilgrims visit the place every year; they touch the holy stone seven times, after which they enter the Kaaba and offer up their prayers. In praying the Mussulman always turns his face towards the sacred Kaaba of Mecca.

KABBALA. See CABALA.

KABUL. See CABUL.

KABYLES. See BERBERS.

KADIAK, or KODIAK, the largest of the Aleutian islands, 120 miles long by 60 miles broad, is separated from the north-west extremity of America by a channel about 40 miles wide; has a mountainous surface and an irregular and deeply indented coast, with some good harbours. Near the coast the soil is fertile, and generally covered with thick grass. Strawberries and gooseberries are abundant, and oats, barley, and common kitchen herbs are raised. The interior is partially covered with forests of pine, birch, poplar, and willow. Bears and foxes are common, but other animals yielding fur have become comparatively rare. The principal depôt for the furs of all the Aleutian Islands is on the Bay of Liakhik, in this island. Pop. about 3600.

[1] Where the reader may fail to find articles under *K*, he is referred to *C*.

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KÆMPFER, Engelbrecht, a famous traveller, born at Lemgo in 1651, and excellently educated by his father, a clergyman, studied medicine at Königsberg, performed a journey in 1683, as secretary to a Swedish embassy, by land through Russia to Persia; after which, in the capacity of naval surgeon, he visited Arabia, Hindustan, Java, Sumatra, Siam, and Japan, in which last country he resided two years. In 1692 he returned, was appointed private physician of the Count of Lippe in his native city, and died in 1716. Of his writings, his History and Description of Japan is deserving of mention. This work was translated into English from the manuscript in 1727, published at London in two folio volumes; and in the German language it appeared first at Lemgo in 1774, edited by Dohm. The greater part of his manuscripts, rich in important observations, are in the British Museum, having been purchased from Kæmpfer's heirs by Sir Hans Sloane, whose bequest to the public formed the nucleus of that institution.

KAFFA. See Feodosia.

KAFFIR, or Kafir. See Caffres.

KAFFRARIA and KAFFRES. See Caffraria and Caffres.

KAIRWAN, a large town in the regency and 80 miles s.s.e. of Tunis, in a barren sandy plain, and surrounded by a wall. The town is well built and contains several elegant buildings. It is badly supplied with water; the inhabitants depending on a capacious reservoir filled by the rains, and a pond, which becomes nearly dry in summer, when it emits noxious exhalations. Notwithstanding its ill-chosen situation it ranks second only to Tunis in trade and population. Kairwan was the first seat of Saracenic empire in Barbary, and still exhibits many fine relics of its ancient grandeur in the fragments of beautiful architecture which abound in it, besides one of the most magnificent mosques in Barbary. It is one of the three holy Mohammedan towns, and the fanatical spirit of the inhabitants renders access to it difficult. Its population, which at one time, according to Arabian historians, was at least 60,000, does not now exceed 15,000.

KAISARIAH, or Kaisariyeh, a town in Asia Minor, anciently called *Cæsarea*. See Cæsarea.

KAISERSLAUTERN, a town in the Bavarian Palatinate, on the Lautern, here crossed by a bridge, and on the Pfälzer-Ludwigs Railway, 43 miles s.s.w. of Mainz. It is walled, has several public offices; a normal and other schools; and the remains of an old castle, built by Frederick Barbarossa, and now converted into a central prison; manufactures of woollen cloth, cotton goods, hosiery, stoneware, and leather; breweries, glass-works, a paper and other mills; important iron-works, supplied from iron mines in the neighbourhood; and has a considerable trade in fruit. Three successive engagements were fought here in 1793–94 between the French and Germans, in which the latter were successful. Pop. (1880), 26,323.

KALAFAT, a town in Roumania, capital of a district and on a plain of same name, on the left bank of the Danube, about 1 mile east of Widdin, on the opposite bank, and 370 miles north-west of Constantinople. It is surrounded with walls; consists of about 2000 houses, and has three churches, a town-hall, custom-house, quarantine, and cavalry barracks. In 1853–54 the Turks threw up formidable redoubts and other works partly on two high hills in its plain, while awaiting the attack of the Russians. On two several occasions (10th January and 19th April, 1854) the Russians were driven back from the place.

KALAHARI (or Kalihari) DESERT, a region of South Africa, extending from the Orange River to Lake Ngami, and from lon. 24° e. nearly to the west coast. It is called a desert simply because it contains no running water, and very little water in wells. It is by no means destitute of vegetation and inhabitants. Besides a covering of grass and of creeping plants in great variety there are large patches of bushes and even trees; prodigious herds of antelopes, which require little or no water, roam over its plains; and on the game thus bountifully provided, as well as on the vegetable products, particularly water-melons and large tubers of a very remarkable description, a great number of human beings, Bushmen and Bakalahari, subsist. The surface of Kalahari is remarkably flat, and is intersected in different parts by the beds of ancient rivers. The soil is in general a light-coloured soft sand, but in the ancient river-beds there is a good deal of alluvium, which, when baked hard, becomes so retentive that in some cases pools formed by the rain contain water for several months in the year.

KALAMATA, or Calamata (Greek *Kalamai*), a seaport of Greece, in the Morea, capital of the government of Messenia, at the head of the Gulf of Koron. It stands about a mile from the sea on the left bank of the Nedon, a torrent which emerges from a rocky gorge in Mount Taygetus; and has a small suburb on the other side of the torrent, with mills and gardens supplied from it by an artificial channel. It is the seat of the bishopric of Messenia, of a court of first resort, and has an active trade. Its exports consist of wool, oil, raw silk, and figs of the first quality. It is noted for a particular kind of handkerchief, which, from the brilliancy of the colours and moderate price, is in great demand throughout the Levant. The town was burned by Ibrahim Pasha in 1825. Pop. 9411.

KALAMAZOO, a town of the United States, Michigan, capital of the county of Kalamazoo, on the left bank of the river of same name, and on the Michigan and Chicago Railway, 100 miles north-east of Chicago. It stands in a beautiful and fertile country, and has a very attractive appearance, being regularly built in spacious streets, which are shaded by fine oak-trees. Its principal buildings and institutions are several churches, a college for both sexes, a female seminary, and the state lunatic asylum. The industrial establishments are soap and candle works, an iron-foundry, a machine-shop, a tannery, flour and planing mills, and factories in which piano-fortes and agricultural implements are made. Pop. 8057.

KALBE, a town of Prussia, in the government and 15 miles south of Magdeburg, capital of the circle of the same name, on the left bank of the Saale. It is surrounded by walls with five gates. It has manufactures of woollens, paper, chicory, oil, and beet-root sugar. Pop. 8521.

KALE. See Cabbage.

KALEIDOPHON, an arrangement designed by Sir C. Wheatstone to illustrate the transverse vibration of elastic rods and to show how vibrations in different directions interfere with each other. The rate of transverse vibration of an elastic rod depends on its length, breadth, and thickness. Each rod experimented upon is attached at one end to a massive support, and carries a silvered glass bead at the other. When a square rod is made to vibrate in two directions at the same time, the bead moves in straight or elliptic paths according to the relative phases of the two sets of vibrations. A screw is made to touch one side of the rod near the free end; this virtually shortens the side, the rod no longer vibrates in the two directions in the same time, and the bead describes peculiar curves which vary rapidly in form. Similar effects are produced when the rod is thicker in one direction than the other. In all cases the

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curves depend on the relative rates of vibration of the rod in two directions, and the rapid changes observed are due to changes of the difference of phase in the two sets of vibrations. When the rod vibrates twice as rapidly in one direction as in the other the curve changes from the figure 8 to a parabola and back again. These motions of the bead are combinations of pure harmonic motions; their properties are investigated in treatises on kinematics.

KALEIDOSCOPE, an optical toy invented by Sir David Brewster; it creates an infinite variety of symmetrical arrangements of coloured images, and is of use to designers. When two mirrors are inclined at an angle which is an aliquot part of 360° any object placed between the mirrors gives rise to a series of symmetrically arranged images. The kaleidoscope usually consists of a tube containing two glass plates which extend along the whole length of the tube and make an angle of 60° with one another. One end of the tube is closed by a metal plate with a small hole at its centre, to which the eye is applied; at the other end there are two plates, one of ground the other of clear glass (the latter being next the eye), with a number of pieces of coloured glass lying loosely between them. A brilliant circle formed by the coloured glasses and their images in the glass plates, which act as mirrors, is seen on looking through the instrument. Whatever colours are visible in the sector of the circle inclosed between the mirrors are also found in the other five equal sectors of the circle, so that however irregular may be the distribution of colour formed by the pieces of glass the images coalesce into figures which are mathematically symmetrical and highly pleasing to the eye. When the objects are made to change their positions the combinations of images take entirely different but equally symmetrical shapes, sometimes vanishing sometimes emerging at the centre of the circle and sides of the sectors. The mirrors may be rectangular or triangular in shape; they may be of metal or of silvered or unsilvered glass; the images may be viewed through a magnifying eye-piece; the objects may be coloured beads or other bright objects, and when the ground glass is removed may be viewed by light reflected from their surfaces; instead of having bits of coloured glass inclosed between glass plates an object-glass may be used to create images of distant objects; the effects may be exhibited to large audiences by being thrown upon a screen. When the mirrors make an angle other than 60° the number of sectors into which the brilliant circle is divided is equal to 360° divided by the angle. Thus when the angle is 18° there are twenty sectors; when the angle is 45° there are eight sectors.

When a third plate of glass is introduced into the tube so that the cross section of the three is a triangle the arrangement is merely equivalent to three kaleidoscopes of the first kind; when the section is an equilateral triangle we get a very pleasing set of images; when the section is a triangle whose angles are 90°, 45° and 45° or 90°, 60° and 30°, the effects are exceedingly beautiful.

KALENDAR. See CALENDAR.

KÂLIDÂSA, one of the greatest Indian poets and dramatic writers, lived, according to tradition, at the court of King Vikramâditya, at Ujjayini, in the first century B.C. He was one of the nine poets who were called the nine precious gems of the court. Vikramâditya (sun of strength) is a title borne by several Indian monarchs, and some authorities assert that Kâlidâsa flourished in the sixth century, while others mention the eleventh. His best production is the drama S'âkuntala, which was translated into English by Sir W. Jones (Calcutta, 1789), and at once aroused in Europe attention to Sanskrit literature. It was translated into German by G. Forster (1790) and Herder (1803), and into French by Chézy (published with the Sanskrit original, 1830). Another drama of his, Vikramorvasi, or the Hero and the Nymph, was translated into English by H. H. Wilson (Calcutta, 1813), and was published with a Latin translation by Lenz (Berlin, 1833). Besides these works Hindu tradition ascribes to his authorship the following:—Mâlavikâ and Agnimitra, a comedy of intrigue (edited by Tullberg, Bonn, 1840); two epic poems, Raghuvansa and Kumâra-Sambhâva, both published in Sanskrit and Latin by Stenzler (London, the first in 1832, and the second in 1838); Megha-dûta, a lyric poem (published with a free English translation by Wilson, Calcutta, 1813); and several other dramatic and lyrical pieces.

KALISCH, or KALISZ, a town in Russian Poland, on an island in the Prosna, near the Prussian frontiers, 132 miles W.S.W. of Warsaw. It is surrounded by walls flanked with towers, consists of spacious streets, occasionally lined with trees, and well-built houses. The most remarkable edifices are the palace, in which the grand-dukes of Poland long used to reside; the cathedral, the church of St. Nicholas, and the Lutheran church; a fine library, with extensive scientific collections; a Roman Catholic gymnasium, military school, theatre, and three hospitals. It is the centre of a considerable trade. Kalisch was founded in 655, and early became the seat of government; in 1706 the Poles defeated the Swedes in its vicinity. Pop. 20,280.

KALKBRENNER, FRIEDRICH WILHELM, a distinguished piano-forte player and composer, born at Cassel in 1788, studied musical composition and the piano-forte in Paris under Catel and Louis Adam, and in 1802 gained the double prize of the conservatory of music there. He was afterwards, on the recommendation of Haydn, who acted to him like a father, instructed in counterpoint by Albrechtsberger. After travelling through Germany, in 1814 he proceeded to London, and by his ability, both as a player and teacher, he acquired both fame and wealth. In 1824 he made Paris his residence, and established, in concert with Pleyel, a manufactory of pianos, which became famous. His musical compositions are very numerous, but in general remarkably difficult. His Studies have long enjoyed a high reputation. He died of cholera at Enghien, near Paris, in 1849.

KALMAR. See CALMAR.

KALMIA, a beautiful North American genus of shrubs, having coriaceous, ever-green and cup-shaped flowers, of a fine rose or purple colour, disposed in large corymbs. The corolla is provided with ten little pits, prominent externally, and in which the anthers are confined. It belongs to the natural order Ericaceæ. The *K. latifolia*, commonly called *mountain laurel* or *calico bush*, is a large shrub growing most abundantly on and about the Alleghany Mountains, but sometimes in the vicinity of the ocean, in the middle and eastern states, as far north as lat. 43°. The trunk is sometimes 3 inches in diameter, and the wood is very hard, susceptible of a fine polish, and more nearly resembles box than any other North American wood. This shrub is in great request in European gardens, from the beauty of its flowers and foliage. The other different species of kalmia are much inferior in stature and the size of the flowers, though still highly ornamental.

KALMUCKS, or as they style themselves, the *Derben-Eret* (the Four Allies), the most remarkable branch of the Mongol race. They themselves maintain that their primitive residence was situated between the Koko-Nor (the Blue Lake) and Tibet. Long before the time of Genghis Khan a part of this people is said to have made an expedition to the

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west as far as Asia Minor, and to have lost themselves there among the Caucasus Mountains; while the rest, who had remained in Great Tartary, received from their Tartar neighbours the name of *Khalimik* (the separated). They have oblique narrow eyes, black eyebrows, small flat noses, high cheekbones, large ears, and round heads; they are short in stature, have broad shoulders, and a deeply swarthy complexion. Their ordinary food is barley-flour soaked in water, and their favourite drink fermented mare's milk, to which they give the name of *koumiss* (see KOUMISS), and a spirit distilled from koumiss. They are a nomadic, predatory, and warlike race, and though hospitable, are much given to deceit and thieving. They have been divided, at least since the dismemberment of the Mogul Empire, into four principal branches, called Khoshot, Dzoungar, Derbet, and Torgot. The greater portion of the Khoshots have remained in and around Tibet and on the Koko-Nor, and are said to have been under the protection of the Chinese since the downfall of the Dzoungar Kalmucks. The smaller portion of this tribe had long before retired to the Irtish, and finally fell under the dominion of the Dzoungar horde, with which it took part in the war against China, and was dispersed with them. The horde of the Khoshots (warriors), which is still united under the Chinese sovereignty, is rated at 120,000 souls. The Khoshots maintain the first rank among the Kalmuck tribes. A part of them, about 1800 families, settled on the Volga in 1759, and voluntarily submitted to the Russian sovereignty. At the dismemberment of the Mongol Empire the Dzoungar Kalmucks constituted but one tribe with the Derbets, which was afterwards divided between two brothers of their princely family. In the seventeenth century and the beginning of the eighteenth the Dzoungar horde subjected a great part of the other Kalmuck tribes, especially the Khoshot, Derbet, and Khoit, and carried on bloody wars both with the Mongols and with the Chinese Empire, which terminated in their entire subjugation and dispersion. They were regarded as the bravest, richest, and most powerful horde. The Derbet Kalmucks, whose pasture-grounds were originally situated in the region of the Koko-Nor, departed thence on account of the Mongol disturbances towards the Irtish, and separated into two parties. One of them became united with the Dzoungars, and was finally destroyed with them. The other settled on the Ural, Don, and Volga, and the majority of them joined the Torgots, but afterwards separated from them. The Torgot (Volgaic) Kalmucks seem to have been formed into a distinct horde later than the other Kalmuck branches. In the very beginning they separated from the restless Dzoungars, and settled on the Volga, and submitted to the Russians in 1616. But the oppression of the Russian government having excited dissatisfaction among them, they returned to Dzoungaria in 1770, and put themselves under the Chinese protection. Here, however, strict measures were at first adopted against them. All these different tribes are under the rule of their own khans, who are tributary to the government under which the horde lives. There is also a colony of baptized Kalmucks, to which the Russian government has granted a fertile territory, with the city Stavropol, in the government of Simbirsk. In the same district there is likewise a small colony of Mohammedan Kalmucks. Those subject to Russian rule amount to about 60,000.

KALOCSA, a town of Hungary, county of Pesth, and 67 miles south of the city of that name, in a marshy and unhealthy district near the left bank of the Danube. It was once strongly fortified, and was a place of great importance till it was almost destroyed by the Turks. It is still the see of an archbishop, has a cathedral, several other churches, a bishop's palace, ecclesiastical seminary, Piarist college, lyceum, gymnasium, and head national school, and several fairs. Pop. (1880), 15,789.

KALONG BAT (*Pteropus edulis*), one of the Javan *Pteropidæ*, Fox Bats or Roussettes, so named from the fox-like shape of the head. These bats are chiefly found in Java and the islands of the Eastern Archipelago. The Kalong bat is the largest species of Pteropidæ, and among the largest of bats generally; the wings in some forms measuring from 4 to 5 feet from tip to tip, whilst the body itself may measure 2 feet in length. In habits these bats are phytophagous, feeding principally on fruits; and although most are nocturnal in habits, some few fly about during the day. The Pteropidæ or Fox Bats are distinguished by the tuberculate character of the molar or grinding teeth—a structure adapted to the wants of vegetable feeders; by the shortened or rudimentary tail; by the moderately-sized ears; by the large eyes, and by the absence of nasal appendages or leafy structures, situated within the nostrils. The thumb is short, and provided with a well-developed claw-like nail. The Fox Bats are entirely absent from the New World.

KALUGA, an extensive government of European Russia, bounded by those of Moscow, Smolensko, Tula, and Orel; lying between 35° 48′ and 37° 22′ E. lon., and 51° and 54° 30′ N. lat. Its territorial extent is about 10,000 square miles; pop. 1,098,814. About one-half the surface is covered with forest, and the greater part of the remainder is capable of cultivation. The chief products are corn, hemp, and flax. The principal rivers are the Oka, which is navigable, the Upa, and the Schisdra. This province contains iron-mines and chalk-beds. The climate is one of the most temperate in Russia.

KALUGA, a town of Russia, capital of the above government, stands on an elevation on the right bank of the Oka, 98 miles south-west of Moscow. It is nearly 7 miles in circumference, and is surrounded by a rampart, which has been formed into a walk. The streets are narrow and crooked, and the houses for the most part of wood; but several of the public buildings, which are built of stone, are handsome. It is the see of a bishop, and has over twenty churches, a college for priests, a nunnery, a foundling hospital, a gymnasium, and a theatre. Numerous manufactures, but particularly of sail-cloth to supply the navy, make Kaluga a stirring place, and entitle it to be regarded as one of the most important manufacturing towns in the Russian dominions. Pop. 38,608.

KAMA, the largest tributary of the Volga, rises in a branch of the Ural Mountains, on the eastern frontiers of the Russian government Viatka; flows first north, then north-east into the government of Perm, then circuitously S.S.E. to the town of Perm, then south-west into the government of Kasan, and about 40 miles below the town of that name, after a course of about 1000 miles, joins the left bank of the Volga, almost doubling its volume. It is navigable almost throughout its whole course, and a canal connecting its tributary Iujna Keltma with the Siverna Keltma, a tributary of the North Dwina, gives an interrupted communication between the Caspian Sea and the Arctic Ocean.

KAMENETZ, or KAMÉNIEC, a town, Russia, capital of the government of Podolsk, on the Smotritz, about 12 miles above its junction with the Dniester. It is defended by a castle, and though not regular is well built. The most remarkable edifices are the Roman Catholic cathedral and several other Roman Catholic and Greek churches, the

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library, and the gymnasium. Kamenetz was long considered the key of Poland on the side of Turkey. Pop. 22,611.

KAMES, Lord. See Home (Henry).

KAMPTULICON, the name given to a recently-invented floor-covering. Numerous substances, two or more combined, are used in its composition: india-rubber, gutta-percha, dried films of linseed-oil, saw-dust, cork, fibres of cotton, hemp, tow, jute, and wire. The best kinds are made of equal quantities of caoutchouc or gutta-percha liquefied by naphtha or other solvent, mixed with cork which has been ground into a fine dust. This mass, while warm and soft, is passed under steam-heated cylinders, by which it is made into sheets 10 or 12 yards long, varying in width from 2 to 3 yards, and in thickness from $\frac{1}{8}$ inch to 1 inch. The sheets are allowed to lie flat until they harden, and then rolled up as fit for use. Ornamental designs may be painted in the same way as on ordinary hempen floor-cloth. When additional substance and strength are required the composition is spread on a backing of canvas or woollen baize. It is more expensive than ordinary floor-cloth, but has the advantages of being more elastic to walk upon, more noiseless, and better adapted to keep out damp.

KAMTCHATKA, a large peninsula on the north-eastern coast of Asia. On the east it has the North Pacific Ocean, and on the west the Sea of Okhotsk. It extends from 51° to 62° N. lat., and from 155° 10′ to 173° 20′ E. lon., and is reckoned upwards of 800 miles in length and 190 in average breadth; square miles, 85,000. It is remarkable for its extreme cold, which is heightened by a range of very lofty mountains, extending the whole length of the peninsula. Several of these mountains are volcanic, but the most remarkable is one situated near Nijni Kamtchatsk, the volcano of which is very active, and two years seldom elapse without some violent eruption. The principal river is the Kamtchatka, with its affluent the Yelovka, navigable for 150 miles. The most fertile portion of the peninsula lies along the valley of this river. The Russian settlers here raise oats, barley, rye, potatoes, and garden vegetables, but the rest of the country is little adapted for culture. Kamtchatka scarcely enjoys three months of an imperfect summer. It has a great variety of animals which produce the richest and most valuable furs, such as the sable. Other common animals are the Arctic fox, the beaver, the hare, the marmot, and the argali or wild sheep. The bear is the most formidable wild animal. The coasts and rivers swarm to a most extraordinary degree with fish, which form the main article of food. There is also great abundance of game, particularly woodcocks, snipes, grouse, wild geese, and ducks, the eggs of which last are collected and preserved in the fat of fish. The only trees are stunted birch and dwarf pines and cedar. Shrubs are more plentiful, such as the mountain-ash, wild-rose, and raspberry. There is also a variety of berries. Copper and iron are worked; sulphur abounds, and many minerals are found in the mountains. The only export is furs. The capital is Petropaulovsk, with 600 inhabitants. The Kamtchadales, the predominating race (a branch of the Mongol family calling themselves *Itelmes*), are in general below the common height, have broad shoulders and large heads. The face, and particularly the nose, is long and flat; the eyes small and sunk; the lips thin and hanging, and they have scarcely any beard. They are good-natured, honest, and hospitable, but lazy, intemperate, and sensual. They number about 4500. The other principal tribe is the Korjaks, who live north of lat. 58°. They are a wandering tribe, subsisting on the produce of the reindeer, and differ from the Kamtchadales in language and mode of life. Including the 1500 to 2000 Russian settlers, the population of the peninsula may be set down at 10,000. In 1690 the Russians had some knowledge of this country, but it was not till 1706 that all Kamtchatka was surveyed and occupied by them. Every Kamtchadale village consists of several summer dwellings, built on piles rising several feet from the ground. In winter the occupants of half a dozen of these collect into a winter dwelling 5 feet deep, covered by a cone-shaped roof, and which cannot be entered except by going down the chimney. The clothing of the Kamtchadales is prepared from the skins of reindeer or dogs, but much of the Russian style of dress has been introduced. The chief food of the Kamtchadales consists of fish seasoned with whale and seal fat, and a kind of paste prepared of the tender birch bark. Their favourite drink is the juice of the birch. The chief domestic animal is the dog, which serves for draught. The Kamtchadale does not tame the reindeer, although all the neighbouring people do. The religion of the Kamtchadales was, and is still among the few who have not embraced Christianity, *Shamanism*. But even the Christian Kamtchadales have not relinquished their sorcerers or *shamans*. They believe in an almighty God, creator of the world, called *Kutka*, but do not worship him, because their innumerable *fetishes* absorb all their attention. They believe in the immortality of the soul, which they also ascribe to the meanest brute. They give to animals speech and reason. They relate also that ages ago a universal deluge covered the earth, out of which only one pair of human beings were saved.

KANAGAWA, a town and seaport of Japan, in the island of Niphon, on the north side of a bay in Yedo harbour, 16 miles south-west of that city. It is a long narrow town, stretching for 2 or 3 miles along the bay, having one main street only. The houses are built of wood; the shops large and well supplied. The shores of the bay are very beautiful, and covered with villages, while the view inland is bounded by the magnificent cone of Fusi-Yama. In the Elgin treaty with Japan Kanagawa is named as one of the open ports, and thither the British and other treaty powers went in 1858–59; but the anchorage was found to be so shallow, and the place so inconvenient for residence and trade, that the merchants, seconded by the Japanese, persuaded the consuls to remove the port to Yokohama, about 3 miles nearer the open sea. All consular and official documents, however, are still dated from Kanagawa. The imports in 1879 were £4,665,200, the exports £3,776,054. See Yokohama.

KANDAHAR, or Candahar, one of the chief cities of Afghanistan, on a fertile and well-cultivated plain, 3484 feet above the sea, near the left bank of the Arghandab, 200 miles south-west of Cabul. It is in the form of an irregular quadrangle, inclosed by a mud wall, 27 feet high, with a large tower at each of the four corners, fifty-four semicylindrical bastions, and a broad and deep ditch in front, capable of being filled with water from the river. There are six gates, each protected by double bastions. The circumference of the city is nearly 4 miles. It is regularly built, the two principal streets crossing each other at right angles, with a circular space, formed of shops, and about 45 yards in diameter at the point of intersection. The houses, seldom more than two stories high, are built of mud, and have a mean appearance. Those of the wealthier classes are inclosed with high walls, and have several courts, with gardens and fountains. Kandahar is chiefly supported by the transit trade. It was held by the British in 1839–1842, and again in 1879–81. Pop. 15,000.

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KANDY. See CANDY.

KANE, ELISHA KENT, a recent Arctic voyager, born at Philadelphia, United States, on the 3d of of February, 1820, graduated as M.D. in the University of Pennsylvania in 1842, and shortly afterwards became surgeon to the American mission to China. After leaving China he passed through part of India, visited Egypt and Greece, and then sailed for the west coast of Africa, when an attack of fever obliged him to abandon an intended journey to the Kingdom of Dahomey. Having returned to America, he was employed in the government survey of the Gulf of Mexico in 1850, when he obtained the appointment of senior medical officer to the expedition of two vessels, the *Advance* and the *Rescue*, which sailed from New York on the 22d of May in that year in search of Sir John Franklin. On the return of the expedition Dr. Kane published an account of it under the title of The United States Grinell Expedition in Search of Sir John Franklin—a Personal Narrative. On the 31st of May, 1853, the *Advance* alone, placed under Dr. Kane's command, sailed again from New York to resume the search, and proceeding up Baffin's Bay and through Smith's Strait, reached 78° 43′ N. lat. Here the *Advance* remained frozen up for twenty-one months, and was finally abandoned because provisions were becoming scarce and scurvy and other diseases had made their appearance. The object now was to reach the Danish settlements in Greenland, about 1300 miles distant. This long and perilous journey, partly in boats and partly in sledges, was happily accomplished, after ten weeks of severe privation, with the loss of only one man, and that by an accident. In 1856 Dr. Kane published an account of his second expedition, under the title of Arctic Explorations (Philadelphia, two vols. 8vo), and was awarded the gold medal of the Royal Geographical Society. His health having suffered severely, a voyage to Cuba was recommended, but proved ineffectual, and he died at Havanna on the 16th of February, 1857.

KANGAROO (*Macropus*, Shaw). These animals, absolutely confined to Australia and the adjacent islands, belong to the *marsupial* order of mammals, and are distinguished primarily by the possession of a *marsupium* or 'pouch,' supported on two specially developed or *marsupial bones*, in which the immature young are protected and nourished for a certain period after birth. The kangaroo family (Macropodidæ) is included in the section Poephaga (Grass-eaters) of the order above named, and the characters of the family are very distinct. Thus the dentition is different from the other genera, in that they possess six incisor teeth in the upper jaw and but two in the lower jaw, the latter being most largely developed. Canine teeth, in the adult at least, are entirely wanting, and a considerable gap therefore exists between the incisor and molar teeth, which latter number ten in each jaw. The limbs are greatly disproportioned, the fore legs being short, whilst the hind limbs, together with the hind feet, are greatly elongated; these animals resting upon the elongated tarsus or ankle. By means of the elongated hind limbs, aided by the tail, the kangaroos are enabled to make long and powerful leaps, and thus to progress very swiftly. This leaping movement, indeed, is the regular mode of progression in these creatures. The tail appears materially to assist in preserving the balance of the body, and may also in some degree aid in the forward progression of the creature. The fore feet are rarely brought to the ground, except when feeding. And in sitting, in the erect posture, the animal rests upon its tarsi, the tail forming a central support to the body. The tail is thickened at its base, but gradually tapers towards the extremity. It is generally hairy; but in some forms it may be naked, or covered by small scales. The fore feet possess five toes, each toe being provided with a strong hooked claw. The hinder feet have four toes only, the inner or great toe being rudimentary, whilst the centre toe is greatly developed, and possesses an elongated nail, which resembles a hoof. The two inner toes of the hind limbs are united by a web-like structure. The upper region of the body appears small, and even disproportionate, when compared with the lower portion. The head is of small size, and provided with prominent ears. The upper lip is cleft, as in hares, &c. The stomach appears to be of a somewhat compound nature, and exhibits a division into chambers or compartments, which have been thought to be connected with a kind of rumination, or process similar to that of 'chewing the cud' in other animals. The period of gestation, or that during which the young are carried *in utero*, extends to about thirty-nine days. After birth the immature young are protected in the marsupium for a considerable period; the nipples opening into the pouch, and the milk being forced into the mouths of the feeble young by the action of special muscles, which compress the mammary glands, and which are under the control of the mother. There are two mammary glands, each possessing two elongated nipples. The kangaroos feed upon grass; and although frequently seen collected in numbers, they do not appear to be actually gregarious in their habits. The kangaroos are hunted in various ways, chiefly by dogs, upon which they frequently turn, using their tails and hind-feet as powerful weapons of defence. Sometimes the dogs are seized by the fore-feet, and are then subjected to severe blows from the hinder extremities. The affection of the females for their young is most marked. At birth the young animals do not exceed an inch in length; and even when they have attained a considerable size they are accustomed to seek refuge from danger in the pouch of the parent. The larger species of kangaroos are eaten in Australia. The flesh is said to be nutritious and savoury, and to resemble mutton. The kangaroos include very many species, which vary greatly in size. The chief species are the *Macropus gigantеus*, a large form, the Red Kangaroo (*M. rufus*), and the Bush Kangaroo (*M. fruticus*), &c. From the skin of this latter species chiefly, but also from the skins of other kinds, leather is manufactured, and is largely used for making gloves and shoes. The Tree Kangaroos (*Dendrogalus*) of New Guinea are arboreal in their habits, as implied by their familiar name, and possess prehensile tails; and the Rock Kangaroos (*Petrogale*) of Northern Australia inhabit the mountainous parts of that district. For further information the reader may consult the works of Gould and Waterhouse. (Pl. CXXI.–CXXII. figs. 3, 4, 5.)

KANGAROO-RAT (*Hypsiprymnus*). These animals belong to the Marsupialia, and are simply diminutive kangaroos, resembling ordinary rats in size. They differ from the true kangaroos in possessing well-developed canine teeth in the upper jaw, the true kangaroos being uprovided with these teeth in either jaw. They inhabit Australia, appear to be nocturnal in habits, and to feed chiefly on the roots of plants. The tail is scaly. They are included in the kangaroo family, that of the Macropodidæ.

KANO, a town in Central Africa, in the west of Soudan, capital of a province of same name; lat. 12° N.; lon. 8° 40′ E. It occupies a very unhealthy site near the heart of a morass, and is of an irregularly oval form, surrounded by a mud wall 30 feet high, with a dry ditch on either side, and entered by fifteen gates made of wood, covered with sheet-iron. The houses, formed of clay, and in the Moorish fashion, are very commodious. The manufactures are chiefly leather,

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leathern jars, and dyed cloth, and the trade, which attracts many Arabs and Moors from Barbary, is very considerable. Kano is supposed to occupy the site of Ghana, which was once the chief seat of Arabian power in Africa. Pop. estimated at 30,000.

KANOJE, or KUNNOJE, a town of Hindustan, in the province of Agra, on a plain near the right bank of the Ganges, with which it is connected by a canal, and 70 miles W.N.W. of Lucknow. It was once the capital of a great empire, but now consists chiefly of ruins which extend over several miles. Many of the ancient buildings are richly carved, and though the architecture is generally heavy, some Mussulman tombs are in better taste, and have a light and airy appearance. The modern town has only one tolerable street, and numerous lanes branching off from it.

KANSAS, one of the United States, lying between lat. 37° and 40° N., and lon. 94° 40′ and 102° 50′ W., is bounded on the north by Nebraska, on the east by Missouri, on the south by the Indian Territory, and on the west by Colorado. With the exception of the north-east corner of the territory, where the boundary-line follows the course of the Mississippi River, it has the shape of a parallelogram. Length, east to west, 370 miles; breadth, 200 miles; area, 82,080 square miles; population, 996,096. The principal rivers are the Kansas, which is formed by the union of Republican and Smoky Hill Forks from the Rocky Mountains, and joins the Missouri near Kansas city; and the Arkansas, which rises in the Rocky Mountains, and after crossing part of Kansas from west to east, turns south-east into the Indian territory. The surface of Kansas is chiefly undulating with elevations of no great height. The eastern portion presents a succession of rich prairies, grass-covered ridges, and fertile valleys, with much wood on the banks of the streams. The prevailing rock is limestone, which crops out from the surface, or lies scattered over the ground in the form of boulders. Coal and salt also exist in great abundance. The soil, particularly in the east, is rich and deep, consisting generally of a black loam, sometimes mixed with sand. The climate is mild and agreeable, though marked by violent winds and sudden changes of temperature in the spring months. The buffalo, elk, deer, prairie-dog, antelope, rabbit, and squirrel are among the quadrupeds of the state; and the feathered tribes are represented by the wild turkey and goose, prairie-hen, partridge, golden oriole, blue-jay, red-bird, crow, and a great variety of smaller birds. Kansas was annexed to the United States in 1803, as part of the territory bought from France, under the general designation of Louisiana. It was first organized as a territory in May, 1854, previous to which, however, large companies of emigrants from the States had settled in it. At this time the Rocky Mountains formed its western boundary. For several years after the date last mentioned Kansas was the scene of constant turmoils, accompanied with bloodshed and ruffianism of all kinds, occasioned by the question of the establishment or non-establishment of slavery. After many alternations of success the anti-slavery men at length prevailed, and by the terms of the constitution adopted by the people in 1859 the institution of slavery was prohibited within the territory. In 1861 its condition was advanced from that of being merely a territory to that of an organized state, and it found admission into the Union as such. The chief towns are Leavenworth, Laurence, Atchison, and Topeka. The Kansas Pacific Railway to Denver, &c., passes through it.

KANSAS, or KANSAS CITY, a town of the United States, in Jackson county, Missouri, on the frontier of Kansas, and right bank of the Missouri, about a mile below its junction by the Kansas River. It had a population in 1864 of about 5500, which rose at census of 1880 to 55,785. The town is built on high ground and well laid out with wide streets, and houses chiefly of brick. It has iron foundries, beef and pork packing establishments, and manufactures of leather, bricks, and agricultural implements. It is the centre of several important railway systems, giving the city the command of a large productive agricultural district. The Missouri is crossed here by a bridge 1390 feet long.

KANSOO, or KANSUH, an inland province in the north of China, bounded N. and N.E. by the desert of Gobi and Mongolia, E. by Shense, S. by Sechuen, S.W. by Koko-nor and the desert. It extends between lat. 32° 30′ and 40° N.; and between lon. 98° 20′ and 108° 26′ E.; and comprises a large part of the ancient Kingdom of Tangut; area, 86,608 square miles. The country is mountainous, some of the peaks rising more than 10,000 feet above sea-level. The Yellow River flows through the province in a north-easterly direction, and receives a few large affluents in its course. The climate of Kansoo is rather cold, and the inhabitants make use of skins and furs in their clothing. The soil is in general sterile, but the country east of the Yellow River is fertile, and produces wheat, barley, millet, &c. Wild animals abound, and large flocks and herds are maintained by the Tartars living within the province. In the mountains copper, jade, gold, and silver are met with. The trade of Kansoo is very considerable, and has greatly increased of late years. Lan-choo-foo is the capital. Pop. 21,878,190.

KANT, IMMANUEL, born in Königsberg, in Prussia Proper, April 22, 1724, was the son of John George Cant, whose father had emigrated from Scotland to Prussia about the end of the seventeenth century. Kant's father was a man of strict integrity, and possessed a considerable share of intelligence. He found a fit partner in Anna Regina Reuter, who possessed a mind far above her station, and religious sensibilities of the keenest nature. Though far from being in easy circumstances, his parents resolved to bestow upon their son Immanuel the advantage of a liberal education. He was sent, in 1732, to the Collegium Fredericianum, at the suggestion of Dr. Schultz, a professor of theology at Konigsberg University, a distinguished divine in his day, whose strict religious views had been adopted by Kant's parents. At this school he contracted an intimate friendship with Ruhnken, afterwards so celebrated as a philologist. It is remarkable that at this period Kant devoted his attention principally to philological studies, while his friend Ruhnken seemed to have more fondness for philosophy. In 1740 Kant repaired to the university of his native city, and at first studied theology, in consequence of the necessity of depending entirely on his profession for future maintenance. But at no period did he neglect philosophy and mathematics. Hardly had he arrived at the age of manhood when he lost both his parents, who, indeed, had never been able to afford him much pecuniary assistance; but he was fortunate enough to meet some relations, whose aid, together with his own industry and economy, enabled him to continue his studies. His application was uncommonly great, as is proved by his bold and successful attacks on the doctrines of Leibnitz and Wolf, and his skilful use of the weapons of dialectics against the authority of the most eminent metaphysicians of the day, when he was but twenty-two years of age. After a residence of about three years at the university he acted in the capacity of a private tutor in several families, and lived about nine years with Count Hullesen, at Arnsdorf. Kant read much in this retirement, and

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traced the outlines of several of those philosophical treatises which were soon afterwards published in rapid succession. In 1755 he returned to Königsberg, took the degree of M.A., and produced on this occasion, in the form of an inaugural dissertation, his treatise, entitled Principiorum primorum Cognitionis metaphysicæ nova Dilucidatio. In the same year he published his celebrated work on the Universal Natural History and Theory of the Heavens, or an Essay on the Constitution and Mechanical Structure of the whole Globe, according to the Newtonian System. In this treatise he anticipated several of the subsequent discoveries of Sir W. Herschel. Kant began to lecture, as *doctor docens*, on logic, metaphysics, mathematics, and natural philosophy, to which, at subsequent periods, he added natural law, moral philosophy, natural theology, and physical geography. He soon became popular with the students; but it was long before he obtained a professorship. This did not happen till 1770, when he was at length advanced to the ordinary professorship of logic and metaphysics in the university. Upon this occasion he produced his celebrated inaugural dissertation, De Mundi sensibilis atque intelligibilis Forma et Principiis. In 1787 Kant was made a member of the Royal Academy of Sciences at Berlin. Having once attained independence, his wish to improve his worldly concerns seems to have aspired no higher. He declined various advantageous proposals to transfer his talents to other universities, and at length died by a gradual decay, February 12, 1804. Kant is described as being a lean, little man, not much more than five feet high, with a breast almost concave, and a deformed right shoulder. A high serene forehead, a fine nose, and clear, bright blue eyes, distinguished his face advantageously. He was an excellent table companion, and his company was sought after by the first families of Königsberg. He was, in his exterior, always neat, and even highly dressed. He possessed a boundless memory.

As to the philosophy of this profound thinker, a full account cannot be expected in a work of this sort; a glance at it will be all which we can give. The inquirer into Kant's philosophy should be careful not to reject immediately what he cannot understand, and ought not to expect to understand, without deep study and strict mental discipline. In fact, a man can hardly hope to acquire a good idea of Kant's philosophy without reading him in the original. When Kant appeared, two philosophical systems were most in vogue—that of Locke and his followers, and that of Leibnitz, Wolf, &c. Kant saw that little aid was rendered to the cause of truth by a dogmatic philosophy, whether founded on sensualism or idealism. He wished for certainty in the field of philosophy, and put to himself the questions—What can I know? What is it that I know originally? The acute scepticism of Hume had its influence upon him. Hume proved very satisfactorily that our ideas of cause and effect are not derived from experience; but he rashly concluded, as Kant observes, 'that they are the spurious offspring of the imagination, impregnated by custom.' Kant discovered that Hume had been led to this hasty inference in consequence of having taken too limited a view of the great problem which he had thus partially attempted to solve. He perceived that the idea of cause and effect is by no means the only one which the mind makes use of with the consciousness of its necessity, yet without having derived it from experience. This he found in his endeavours to ascertain what we can know, which led him to the fundamental laws of the mind. Having arrived at this conclusion, he strove to ascertain the exact number of these original or transcendental ideas, or imperative forms; that is, such ideas as we do not derive from experience, but by which, on the contrary, we acquire experience. In the first rank of these are *space* and *time*. Kant shows that all our perceptions are submitted to these two *forms*, hence he concludes that they are within us, and not in the objects; they are *necessary* and *pure intuitions* of the internal sense. Truths acquired by experience never carry with them that absolute certainty; for instance, experience teaches us that the sun rises every day; that all men are mortal; yet we may imagine a day when the sun does not rise, and a man who does not die; but imagination itself cannot suppose anything unconnected with space and time. This primitive intuition must have, as its basis, the primary laws of the understanding, without which we can comprehend nothing. As far as the transcendental ideas, or, as Kant calls them, *categories*, extend, so far extends the knowledge of the understanding *a priori*. Kant was at great pains in endeavouring to ascertain the number of these categories, and he found them to be all comprehended under the four classes of quantity, quality, relation, and modality. The categories themselves are twelve in number. Under the first head are comprised *unity, multitude, totality;* under the second, *reality, negation, limitation;* under the third, *substance* and *accident, cause* and *effect, action* and *reaction;* under the fourth, *possibility, existence, necessity*. These categories are necessary and indispensable for our understanding, as the forms of space and time were for our perceptions; we cannot figure to ourselves anything without the relations of cause and effect, of possibility, quantity, &c., which, with other words, is, we cannot perceive anything except by these original, necessary, unchangeable forms of thought. Hence the demonstrative certainty of mathematics, the objects of which—space, time, quantity, &c.—lie in the necessity of the forms of thought, and not in the range of error to which experience is subject. To produce results the categories are applied to exterior objects, objects of experience, in which application they are subject to error. The three original faculties, through the medium of which we acquire knowledge, are *sense, understanding, reason*. Sense, a passive and receptive faculty, has, as has been already stated, for its forms or conditions *space* and *time*. Understanding is an active or spontaneous faculty, and consists in the power of forming conceptions according to the categories already given, which categories are applied to objects of experience through the medium of the two forms of perception, *space* and *time*. Reason is the third or highest degree of mental spontaneity, and consists in the power of forming ideas. As it is the province of the understanding to form the intuitions of sense into conceptions, so it is the business of reason to form conceptions into ideas. The work in which Kant endeavoured to ascertain these categories, and the province of certain human knowledge, is his Kritik der reinen Vernunft —Critique of Pure Reason (first edition, Riga, 1781). Far from rejecting experience, Kant considers the work of all our life but the action of our innate faculties on the conceptions which come to us from without. Kant proceeds in a similar way with morality; the idea of good and bad is a necessary condition, an original basis of morals, which is supposed in every one of our moral reflections, and not obtained by experience. He treats this part of his philosophy in his Kritik der praktischen Vernunft —Critique of Practical Reason (1788). Kant places unreservedly on two parallel lines all the arguments for and against human liberty, the immortality of the soul, the transitory or eternal duration of the world; and resorts to the feelings to make the balance incline, because the metaphysical proofs on the opposite

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sides are equally great. These opposite arguments on great questions are called, in the works of Kant, *antinomies*. In æsthetics, also, he pursues a similar course, and treats it in his Beobachtungen über das Gefühl des Schönen und Erhabenen (Riga, 1771)—Observations on the Feeling of the Beautiful and Sublime. Another important work of his is the Kritik der Urtheilskraft—Critique of the Power of Judgment (Berlin, 1790). We must also mention Metaphysische Anfangsgründe der Rechtslehre—Metaphysical Elements of Legal Science (1797), Metaphysical Elements of Ethics (1797); Metaphysical Elements of Natural Science (1786); a Pragmatical Treatise on Anthropology (1798); Of Perpetual Peace (1796); Religion considered within the Limits of Reason (1793); the Only Possible Evidence for demonstrating the Existence of the Deity (1763). Most of Kant's smaller treatises, full of acute remarks, are contained in his Kleinere Schriften—Smaller Works (Königsberg and Leipzig, 1797, three vols.), and in the collection edited by Tieftrunk (Halle, 1799, three vols.) Hufeland, the physician, published Kant's work, Of the Power of the Mind, by mere Resolution, to control its Morbid Feelings, with notes. Kant, of course, met with many opponents, the most prominent among whom were Mendelssohn, Hamann, Feder, Garve, Platner, Flatt, Jacobi, Herder, and particularly G. C. Schultze. But his adherents were the more numerous party, and his philosophy has been taught in all the German universities, excepting some Catholic ones.

KAOLIN, or PORCELAIN CLAY. The felspar rocks yield clays by their decomposition. (See CLAY.) Kaolin is the purest form of clay; it is found in primitive rocks in the form of interposed strata, amidst granite blocks. It seems to result from orthoclase by the abstraction of the potash and part of the silica, and addition of water, as is shown by the following formulæ:—

Orthoclase.	Kaolin.
$K_2O.Al_2O_3.6SiO_2$.	$Al_2O_3.2SiO_2 + 2H_2O$.

The above formula for kaolin requires 47 per cent. of silica, 40 per cent. of alumina, and 13 per cent. of water; in some specimens of Chinese kaolin, however, the percentage of silica is nearly twice as great as this. Porcelain clay is white; that from Saxony has a yellow or carnation tint, which, however, disappears on burning; it is friable, unctuous to the touch, and when pure forms a paste with water. It scarcely adheres to the tongue. This clay is infusible in a porcelain furnace. The average specific gravity is 2·2. Kaolin, as dug out of the earth, somewhat resembles mortar. The crude material is first sorted, care being taken to remove admixed quantities of quartz, shorl, &c., as far as possible: the clay is then stirred, while a stream of water flows upon the mass and carries the lighter portion along a channel into a *pit*. In the passage along this channel of the semi-fluid mass a considerable amount of heavy particles is deposited, and a further quantity settles down in the first pit. From this the water containing the lighter particles of the clay in suspension is drawn off, and again allowed to deposit in a second pit. From the pits the water, which now contains only the fine clay in suspension, passes to a larger pit or *pond*, where it deposits the whole of its suspended matter, and when quite clear is drawn off by means of openings in the sides of the pond. When, by successive deposits, the pond is nearly filled with clay, the semi-solid mass is allowed to remain until it can be conveniently removed to the drying-pans, from which again it is passed to the drying-sheds, where, after several months' exposure to currents of air, it is cut into blocks and sent into the market. For a description of the manufacture of porcelain see POTTERY.

KARAITES, a Jewish sect, which sprang up in Babylon about the middle of the eighth century; they themselves date their origin, however, from the captivity of the ten tribes by Shalmanezer. The founder of the sect was Anan Ben David, who is supposed to have held a high spiritual office at Bagdad, 754–775 A.D. The name (Hebrew *Karaim*, scripturists) indicates generally the character of the sect: they refuse to accept as divine or authoritative the traditions and doctrines of the Talmud, or in the rabbinical writings, and adhere closely to the text and letter of the Old Testament. They have broken off all communion with the orthodox Jews, who accuse them of being little else than Sadducees, and of rejecting all the books of the Old Testament except the Pentateuch, and of giving only a seeming acceptance of the doctrines of the immortality of the soul and of a future state of bliss and misery, in order not to be put under the ban of all other religious parties. The sect soon found numerous representatives in Palestine, Egypt, Greece, Spain, Barbary, Syria, Byzantium, &c. They are now confined to Poland, Galicia, Alexandria, Constantinople, and are found in considerable numbers in the Crimea. They have an extensive Hebrew literature of their own, embracing works on theology, philosophy, astronomy, mathematics, a rich collection of which is found in the Imperial Library at St. Petersburg.

KARAMAN (anciently *Laranda*), a town of Asiatic Turkey, in the pashalic of Karamania, in an extensive valley to the north of Bedlerin-tag, a lofty mountain in the chain of the Taurus. In the town are a large and handsome Armenian church and several ruined mosques, of graceful Saracenic style. There is a Turkish castle or fortress. Most of the houses are in a ruined and dilapidated state, and the bazaars are very indifferently supplied. There are considerable manufactures of blue cotton and other cloths, and an active trade is carried on with Smyrna, Kaisariah, and Tarsus, in cotton goods, hides, and nut-galls. Karaman was formerly the residence of the pasha, but he now resides at Iconium. The population is estimated at about 12,000.

KARAMANIA, or CARAMANIA, and from its capital also KONIA, or KONIYEH, a pashalic of Asiatic Turkey, Asia Minor, having the pashalics of Itshil or Adana on the S., Anatolia and Sivas on the W. and N., and Marash on the E.; lat. 37° to 39° 40′ N.; lon. 30° 50′ to 36° 50′ E. A large portion of it is mountainous, the Taurus range traversing its entire length east to west, separating it in part from the pashalic Itshil, and forming the greater portion of its southern boundary. Its principal rivers are the Kizil-Irmak and the Syhoon. In the south-western portion are numerous small lakes. The mountains are covered by forests of oaks, and some species of pines rising 100 feet in height. The vine and fig tree, the laurel, myrtle, and clematis, together with innumerable odoriferous shrubs, flourish in profusion; and abundant harvests are reaped from its rich, deep soil; while the climate is so genial that the inhabitants can pass three-fourths of the year under the shade of the trees. The scenery in the mountainous districts is singularly fine. Tobacco, silk, cotton, sesame, and excellent fruits are raised, but the principal occupation is rearing live-stock. Karamania includes ancient Lycaonia, and a portion of Phrygia Major, Galatia, and Cappadocia; and it formerly included the maritime pashalic of Itshil or Adana, which, in its turn, is composed of ancient Cilicia, Isauria, and Pamphylia.

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KARAMSIN, NICOLAI MICHAILOVITCH, imperial Russian historiographer, born in a village of Eastern Russia in 1765, educated at Moscow in the house of Professor Schaden, entered the military service, which he quitted in two years, and travelled, from 1789 till 1791, through Germany, France, Spain, Italy, Switzerland, and England. On his return to Moscow he devoted himself with great zeal to literature; he edited in succession the Moscow Journal, the Aglaia, a Poetical Almanac, a Pantheon of Foreign Literature, a Pantheon of Russian Literature, and became an active contributor to the European Messenger. Among his writings of that period were poems, prose sketches of various kinds, translations from German, French, and English, and, more especially, his Letters of a Russian Traveller, which were enthusiastically received. In 1803 he was appointed by the Emperor Alexander imperial historiographer, with a pension of about £280, and from that time he laboured incessantly at his History of Russia (twelve vols. St. Petersburg, 1816–24), for the preparation of which all the national archives were thrown open to him. The emperor conferred on him the order of St. Anne, and gave him £8600 for the publication of his great work. A free residence was also allowed him in a pleasure castle of the Empress Catharine II. The third edition of Karamsin's works appeared in 1815, in nine volumes. Of his history the second edition appeared in 1818. When on the point of making a journey to Italy to recruit his shattered health he died June 3, 1826. Just before his death the Emperor Nicolas had granted him a pension of £4000, which was continued to his widow and children. Sir John Bowring translated some of his poems.

KARA-SU-BAZAR, a town of Southern Russia, in the government of Taurida, in the Crimea, 24 miles east-north-east of Simferopol. It is surrounded by gardens, and contains over twenty mosques, and has also Greek and Roman Catholic churches and a Jewish synagogue. It is the great mart of the Crimea, and has a weekly market and annual fair. The manufactures comprise morocco leather, soap, candles, pottery, and tiles. Pop. 11,699.

KARATCHEF, a town in Russia, capital of the circle of the same name, in the government of, and 47 miles W.N.W. of Orel, built of wood. The inhabitants are maintained chiefly by agriculture, the ordinary handicrafts, and shopkeeping. Rope and twine are made to some extent for exportation. It has several fairs. Pop. 11,267.

KARIKAL, a small French settlement in the Carnatic, Hindustan, on the Coromandel coast, with a capital of the same name, situated lat. 10° 55′ N., lon. 80° 10′ E., near the mouth of one of the branches of the Cavery. The tract, about 63 square miles of extent, and containing about 61,000 inhabitants, was ceded to the French by the Rajah of Tanjore in 1739, was taken from them by the British in 1803, and restored by the Treaty of Paris in 1814. The exports from the territory, consisting chiefly of rice, are considerable. Pop. of town, 15,000.

KARLSBAD, KARLSRUHE, KARLSTADT, &c. See CARLSBAD, &c.

KARMATHIANS, a Mohammedan sect which arose in Irak during the ninth century of the Christian era. Hamdan Karmat, the founder of the sect, adopted the doctrines of the Ismailis, and was appointed a missionary of that sect by Husein Ahwazi, an emissary of Ahmed, chief of the sect. He soon succeeded in gathering round him a numerous flock, and in making them blind slaves to his will. He introduced communism of property, and even of wives, among them. Round his own house at Kufa a special colony of select converts was formed where all the missionaries were trained, and all the schemes of the growing sect were originated. One of the most noted missionaries, Abu Saïd, was sent to Bahrein, in the Persian Gulf, and in less than two years had gained over the great part of the population. Alarmed at the spread of the new doctrine, the caliph (whom the Karmathians were taught to look upon as a usurper) sent an army of 10,000 men against Abu Saïd. This army was signally defeated, and the conqueror gained possession of the whole country, and transferred the capital from Hajar, which he destroyed, to Lahsa, his own residence. He was assassinated by one of his own eunuchs here in 914. His son Abu Tahir, who succeeded him four years later, seized the town of Bassora in 923, pillaged the annual caravan of the pilgrims on its way to Mecca, and sacked Kufa in 924. In 930 he captured the holy city itself, put its inhabitants to the sword (the massacre lasting according to some from eleven to seventeen days), and desecrated the sacred Kaaba, carrying off the Kebla itself. At his death, in 938, he was master of almost all Arabia, Syria, and Irak. Under the reign of his two brothers, who succeeded him, the power of the sect began rapidly to decline. In 986 they were defeated in a battle before Kufa, and in consequence lost their hold on Syria and Irak. Three years later another disastrous battle completely broke the power of the once formidable band. According to some travellers (Palgrave, De Sacy, &c.) remnants of the sect still exist at Hasa, the modern name of Lahsa, their former capital.

KARNUL, or KURNOOL, a town in India, in the presidency of Madras, and 190 miles N.N.W. of the city of Madras, capital of the district of the same name, situated in the fork formed by the junction of the Hundri with the Tungbhadra. It consists of a pettah or native town and a fort, the latter surrounded by a wall of limestone and sandstone 17 feet high and 9 feet thick, and flanked with circular bastions. On the north and east, where it is washed by the Tungbhadra, no other defence has been deemed necessary. The climate of Karnul has a bad name. Pop. 23,000.

KARROOS, the Hottentot name, now adopted by physical geographers, for the table-lands or extensive plains between the mountain ranges at Cape Colony. They are exuberantly fertile during the rainy season, but, as this period is of short duration, the repair of cattle to graze on them forms a sort of holiday with the Dutch farmers and their servants, as giving variety to their usually monotonous existence; and the expression of a 'Karroo life' has come to be considered in the colony synonymous with a life of frolic and merry-making, and relieved from wonted restrictions. During the dry season they become parched arid deserts. The *kloof*, a sort of companion name to the karroo, is the name of the longitudinal valleys extending between the ranges of the declivities mentioned; some of them are of great extent, the Lange Kloof, or Long Valley, being upwards of 100 miles in length.

KARS, a town of Turkish Armenia, capital of the eyalet of same name, picturesquely situated on the Kars, in an amphitheatre of black basaltic hills, inclosing an elevated plateau, 90 miles north-east of Erzeroom. It consists of two parts on opposite sides of the river, and communicating by a bridge; and, from the dark colour of the basalt of which it is built, and the absence of trees, has a very dismal appearance. It is defended by ramparts and a ditch, and has a strong citadel. During the Russian war it was defended by a Turkish garrison, under the direction of the British commander General Williams, and for upwards of two months maintained success-

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fully a gallant defence against the Russians under Muravieff. It was at last compelled by famine to surrender, on November 27th, 1855. On the 18th of November, 1877, it again fell into the hands of the Russians, being taken by storm.

KASAN, or KAZAN, a government of European Russia, surrounded by the governments of Viatka, Orenburg, Nijnei-Novgorod, and Simbirsk. Its territorial extent is over 25,000 square miles; its population 1,872,437, partly Russians and partly Tartars, though of very mixed origin. The rivers are the Volga, the Kama, the Sura, the Viatka, and the Kasanka, besides smaller streams, and a great number of lakes. The climate on the whole is mild; the winter is keen, but not protracted. Agriculture is extensively carried on, but not in a very perfect form. Hemp is grown to a great extent, but flax is deficient in quantity and quality. The rearing of cattle forms a profitable employment in the meadows and pastures of the rich flats which border the numerous streams. Fishing in the lakes and rivers employs a great number of hands. The government, moreover, possesses numerous manufactures, and has an extensive trade, both external and internal, which the large navigable rivers greatly facilitate. The district was originally populated by Finns, who were driven out by the Tartars. In 1552 Ivan Vassilievitch II. destroyed the Tartar power, and annexed Kasan to Russia.

KASAN, a fortified city of Russia, capital of the government of the same name, on the Kasanka, about 4 miles above its junction with the Volga, 460 miles east of Moscow. It covers a space of nearly 6 miles in circuit, and properly forms three towns—the kremlin or citadel, the middle town, and the lower town. Many Mohammedan Tartars still reside here, engaged in business. It is a bishop's see, and the seat of a small university, founded in 1803. It has also several other schools. Here are large soap-works and tanneries, also manufactures of woollen, cotton, lace, and earthenware. It carries on an extensive trade. The caravans to Bokhara and China pass through Kasan. At a little distance from Kasan is an admiralty establishment, with a navigation school, magazines, and a dock-yard, where vessels are constructed, and sent down the Volga to the Caspian Sea. Pop. 94,170.

KASCHAU, or KOSITZE, a town of Hungary, capital of the county of Abaujvar, beautifully situated in a valley inclosed by sloping vineyards, at the confluence of the Csermel with the Hernad, 124 miles north-east of Pesth. The Csermel intersects the town, and is crossed by several bridges. For its size it is one of the best built towns in Hungary. The principal edifices are an ancient Gothic cathedral, with a lofty copper-covered tower, and fine gildings, carvings, and sculptures; another Gothic church, an old Jesuit church, with two towers; a court-house, town-house, episcopal palace, Ursuline convent, infirmary, theatre, gymnasium, normal and other schools. The manufactures consist of leather, woollen cloth, hats, stoneware, &c.; and the trade is partly in these, but chiefly in wine. Pop. 26,097.

KASHAN, a town of Persia, province of Irak-Ajemi, in a fertile plain 90 miles south from Ispahan. It was founded by Zobeida, the favourite wife of Harun al Raschid, and is one of the most regularly built towns in Persia. It is surrounded by an earth wall pierced for eight gates. It is about 3 miles in length from east to west, by upwards of 1½ mile in breadth, and contains a royal palace, many fine mosques, bazaars, and caravanserais. Coloured and flowered silks of great beauty are manufactured here, along with carpets and cotton cloth, copper utensils, and gold and silver articles, which are greatly esteemed. Pop. (including suburban district) 100,000.

KASHGAR. See CASHGAR.

KASSIMOF, a town, Russia, capital of the circle of same name, in the government of and 70 miles E.N.E. of Riäzan. It stands on a height formed by the left bank of the Oka, and is surrounded by a wall. The streets are narrow and crooked, and though there is excellent building-stone in the neighbourhood, the houses are of wood. Its manufactures are ropes, vitriol, leather, and particularly earthenware. Many of the inhabitants are Tartars, who carry on a considerable trade with the East by way of Bokhara, in furs and silk and cotton goods. Pop. 14,102.

KASTAMUNI, or CASTAMBUL, a town of Asiatic Turkey, in the pashalic of Anatolia, capital of the eyalet of its own name, 100 miles N.N.E. of Angora. The houses are of two stories, in general ill-built of wood; the streets are narrow and dirty. It has numerous mosques and baths, a Greek church, and barracks. The chief manufactures are printed cottons and copper-wares; there are also over twenty dye-works. The principal trade is in wool. Pop. estimated at 48,000.

KATER, HENRY, an English writer on physics, was born at Bristol in 1777. In 1794 he obtained a commission in the 12th regiment of foot, then stationed in India; and having already made great progress in mathematics and physics, he was soon engaged on the great trigonometrical survey of India, a work to which he rendered important service. By his residence in India, however, his health was permanently injured. In 1814 he retired on half-pay, and henceforth occupied himself exclusively with scientific studies. He was employed by the Emperor of Russia to construct standards for the weights and measures of that country, and was presented with a diamond snuff-box, and made a knight of the order of St. Anne. He died in London from an affection of the lungs, 26th April, 1835. He determined the length of the seconds pendulum, investigated the diminution of terrestrial gravity from the pole to the equator, invented the 'floating Collimator,' an instrument of great use to trigonometers, and in conjunction with Dr. Lardner wrote the Treatise on Mechanics in the Cabinet Cyclopædia.

KATHION, KATHODE. When a current of electricity passes through a compound liquid (electrolyte) which is a conductor, the liquid is generally decomposed into two components, to which Faraday gave the name *ions*. The *kathion* goes to the surface where the current of positive electricity leaves the liquid; this surface is called the *kathode*. The *anion* goes to the surface where the current enters the liquid; this surface is called the *anode*. When water is decomposed hydrogen is the kathion, oxygen is the anion. Kathions have also been termed electropositive elements.

KATIWAR, a province of Hindustan, including the whole of the peninsula of Gujrát. It lies between lat. 20° 42′ and 23° 10′ N.; lon. 69° 5′ and 72° 14′ E., and is bounded north and north-west by the Ran and the Gulf of Kach (Cutch), south-west and south by the Arabian Sea, and east by the Gulf of Cambay and district of Ahmedabad; area, 21,000 square miles. It is divided into a great many petty territories, held by chiefs as tributaries either of the British government or of the Guicowar. Their aggregate revenue is estimated at £450,172, of which £104,739 is payable as tribute. The surface is generally undulating, but rises occasionally into a number of ridges, which attain their greatest height near the centre, where most of the streams have their sources. In the south there is a wild tract full of caverns, ravines, and other fastnesses, and with a deadly climate. The grains most cultivated are millet,

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maize, and wheat. Cotton is the principal commercial crop. The soil being generally sandy, cannot be maintained in a state of fertility without constant irrigation. The principal domestic animals are horses, cows, buffaloes, and camels. Among the wild animals are lions, leopards, chetas or hunting leopards, wolves, jackals, wild swine, antelopes, and porcupines. None of these, however, are so destructive as a species of migratory rats, about twice the size of the common rat, which make their appearance at intervals, and move across the country, ravaging it to such an extent that in 1814 they actually produced a famine. Pop. (1881), 2,348,325.

KATRINE, Loch, a lake, Scotland, county of Perth, 5 miles east of Loch Lomond, and 8 miles west of Callander. It is of serpentine form, 10 miles long, in some places 2 miles broad, and remarkably deep, with an island near its east end, commonly called 'Ellen's Isle.' It is encircled by lofty mountains and rocky ravines clothed with trees, and receives numerous mountain streams. At its east end is the celebrated pass of the Trossachs, rendered famous by Scott's Lady of the Lake. Through this pass a stream flows, carrying the surplus waters of the lake to Loch Achray. The water-supply to the city of Glasgow is drawn from Loch Katrine.

KATYDID (*Platyphyllum concavum*), a species of grasshopper of a pale green colour, body about an inch long, found in some parts of North America, and so named from the sound of its note. The sound is produced by the friction of the taborets in the triangular overlapping portion of each wing-cover against the other, and is strengthened by the escape of air from the sacs of the body, so as to be heard on a quiet night at a quarter of a mile distance. The females are noiseless.

KATZBACH, a small river in Silesia, passing near Liegnitz, famous for the victory which the Prussians under Blücher gained, August 26, 1813, over the French under Macdonald. It rained from August 24th to the 28th. Fire-arms could not be used, and the battle was fought hand to hand. The French were broken, and were driven horse and man into the raging Neisse and Katzbach. Great numbers perished in the swollen streams. The result of the battle was more surprising, as a great part of the Prussian troops were raw militia. It is one of Blücher's greatest victories. During the battle and the following days 103 French cannon were taken, two eagles, all the baggage, and 18,000 prisoners. Silesia was delivered, and the consequences were most important, particularly for Bohemia.

KAUFMANN, Marie Angelica, a distinguished painter, was born at Coire, in the Grisons, in 1741, and received her first instruction in drawing and painting from her father, who at the time of her birth was painter to the bishop. Her admiration of the beautiful was early developed. She loved music, and made great progress in painting under the guidance of her father, whose talents were but moderate, and whom she soon excelled. On her first journey to Italy, where she resided from her thirteenth year till 1769, in Milan, Florence, Rome, and Naples, she acquired great skill; and her subsequent visit to London, where she painted the whole royal family, increased her reputation and improved her circumstances. Here she was elected a member of the Royal Academy, and here also she contracted an unfortunate marriage with a Swedish adventurer who gave himself out to be Count Horn. Angelica obtained a divorce, but was obliged to settle an annuity on her husband. He, however, soon died. After her return to Rome in 1782 she was married a second time, more happily, to a Venetian painter, Zucchi, but she never had any children. Zucchi likewise died long before her. Angelica then devoted herself to painting till her death in 1807. Her bust was placed in 1808 in the Pantheon. She painted many portraits and historical pictures, the latter chiefly after antiques. She preferred ideal female figures. Her works are remarkable for grace, though the critic may discover in them incorrectness of style and sameness of plan and execution.

KAULBACH, Wilhelm von, one of the greatest mural painters of modern times, was born at Arolsen in Waldeck, 15th October, 1805. In 1822 he was sent to the Academy at Düsseldorf, where he soon became one of Cornelius' most promising pupils. At the request of his master he was invited in 1825 to assist in painting a great series of frescoes at Munich, where he painted six symbolical figures in the arcade of the Hofgarten, several designs on the ceiling of the Odeon and on the walls of the Glyptothek, and subsequently a series of frescoes in King Ludwig's new palace, drawn from the story of Cupid and Psyche, together with illustrations of Klopstock, Goethe, and Wieland in encaustic and in fresco. In his great oil-painting, the Irrenhaus (the Madhouse, 1828), he first broke away from the severe realism of Cornelius. In 1837 appeared the famous work in sepia the Hunnenschlacht (Battle of the Huns), in which spirits of the warriors whose corpses lie under the walls of Rome are represented as continuing the combat in the air. In 1846 Kaulbach completed the colossal oil-painting, the Fall of Jerusalem, in the Pinacothek of Munich. The subject is represented by Titus placing the Roman eagle on the altar of the temple, while about him are Jewish priests slaying themselves, and women lamenting the downfall of the people; angels are seen leading the Christians out of the city, thus suggesting the triumph of Christianity. In 1847 he was invited to Berlin to decorate with frescoes the entrance-hall of the new museum. The first subject completed was the Tower of Babel, which was followed by the Prime of Greece, the Crusades, and the Reformation. The summer months of several years were spent on these works; the winter months he passed in Munich, where he executed a series of wall-paintings in the Pinacothek representing the history of art since the Renaissance. He also found time to execute a great many portraits, designs, and illustrations to divers books, including Goethe's Reineke Fuchs, a folio edition of the Gospels, and Shakspere's Plays. He sent to the Paris Exhibition of 1867 a remarkable picture, the Epoch of the Reformation, for which he was awarded a medal of honour. Among his latest pictures were Peter Arbues, the Spanish Inquisitor, and the Archangel Michael—the latter completed a a few weeks before his death, and one of his most characteristic works. He was carried off by cholera at Munich, 7th April, 1874.

KAURI PINE. See Damar.

KAZAN. See Kasan.

KEAN, Charles John, son of the celebrated Edmund Kean, was born at Waterford in 1811. He was educated at Eton until the age of sixteen, when he was withdrawn in consequence of his father refusing to maintain him longer at school—a quarrel having arisen between the father on the one hand, and the mother and son on the other. In order to support himself and his mother, Charles adopted the stage as a profession, and on the 1st October, 1827, made his *début* at Drury Lane as Young Norval. In 1830 he visited America, where he met with a cordial reception, and returned to England with an established reputation. He played with great acceptation in the provinces, but it was not until 1838 that he came to the front as a leading actor on the London boards. In 1842 he married

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the accomplished actress Ellen Tree, and in 1845 he revisited the United States, performing with his wife in the chief cities for upwards of two years. In 1851 he became sole lessee of the Princess' Theatre, where he added greatly to his fame by the gorgeous revival of some of Shakspere's plays, and of Byron's Sardanapalus, on a scale of detail, splendour, and accuracy never before attempted. He resigned the lesseeship in 1860, and in 1863, accompanied by his wife, he visited Australia, California, Jamaica, the United States, Canada, &c., having cleared £11,000 by their excursion. He continued on his return to play in London and the provinces until a short time before his death, which occurred 23d January, 1868. Kean was a careful and correct actor, having nothing of his father's genius, but depended much upon scenery and other accessories. As a Shaksperian actor he did not rank high; he attained his greatest successes in such plays as Louis XI., the Corsican Brothers, &c. His knowledge of stage effects gained him the appointment of director of the theatrical performances at Windsor Castle, a post which he held for several years.

KEAN, Edmund, the most brilliant and effective tragic actor of his age, was the son of a Miss Carey (a descendant of Henry Carey, the poet and musician), strolling actress and itinerant vender of perfumes, and an Edmund Kean, a scene-carpenter. He was born in London on the 17th March, 1787, or according to other statements, 1789. His father procured a situation for him as a figurant in the pantomimes at Drury Lane Theatre when he was only two years old. At seven years his mother sent him to school; but order and obedience were not in his character, and he engaged himself as cabin-boy in a vessel going to Madeira. This situation, however, equally displeased him, and, to deliver himself in Madeira, he feigned deafness, and played his part so well that the captain sent him home. In London he could not find out his mother; but a woman who had had him under her care recommended him to Miss Tidswell, an actress at Drury Lane Theatre, who gave him much assistance. At one period after his return to London he exhibited as a clown in a booth. After this he was placed in one of the minor theatres, and was much applauded in Rolla's address to the Peruvians. From this period he commenced reading dramatic productions. His protectress recommended him to a company of players in Yorkshire, where he appeared under the name of Carey. Although not more than thirteen years old, he performed the parts of Hamlet, Lord Hastings, and Addison's Cato well enough to please a provincial audience. In Windsor his talent was applauded by the royal family in Satan's address to the sun, from Paradise Lost, and the first soliloquy in Shakspere's Richard III. In 1808 he married Miss Chambers, an actress in the same company in which he had obtained an engagement at Gloucester. For several years after this event he experienced many vicissitudes of fortune, being frequently reduced with his wife and two children to the verge of starvation. About the year 1813 he was fortunate enough to attract the attention of Dr. Drury, who recommended him to the directing committee of Drury Lane as fitted to revive this declining theatre. He was in consequence engaged for three years at Old Drury. Kean appeared for the first time on the London boards, January 26, 1814, in the character of Shylock. The first evening was decisive; but his Richard III. made him the idol of the Londoners. In Othello, also, and Sir Giles Overreach, he was unequalled by any contemporary. He had been engaged at a salary of £8 a night for the first year, but on his third representation of Shylock it was raised to £20. Not long after he received from the committee of the theatre a present of £500, besides many valuable gifts from private persons. In 1820 he visited the United States, and performed in New York, Philadelphia, Baltimore, and Boston, on the whole with great success. His hold on public favour was uninterrupted until his connection with the wife of Alderman Cox, and the consequent action at law, Jan. 25, when a verdict of £800 damages was pronounced against him. He was hissed from the stage in London and Edinburgh. A second visit to America in the same year was attended with little credit or advantage. After his return to England in 1826, his health and spirits, undermined by his dissolute habits, gave way rapidly; he could no longer study any new parts, and it was only by the use of stimulants that he could still act his old ones. In February, 1833, he was announced to appear in Othello with his son Charles, with whom, after an estrangement of several years, the result of his misconduct, he had been reconciled. On the night of the performance he struggled through the first two acts, but in the third act he fell exhausted into his son's arms, and was carried from the stage. This was his last appearance in public. His death took place at Richmond on the 15th of May, 1833.

KEATS, John, an English poet of fine sensibility and great luxuriance of language, was born of humble origin in Moorfields, London, on the 29th October, 1796. He was sent to school at Enfield, where he remained till the age of fifteen, and was then bound apprentice to a surgeon; but his inclination to poetry having been cultivated by his teachers at school, he gave way to the ambition of becoming a poet. Keats' first volume of poems, many of which were written in his teens, made its appearance in 1817, when he was in his twenty-first year. This was followed by Endymion, a Poetic Romance, in 1818; and in the year 1820 he published his last volume, containing Lamia, Isabella, The Eve of St. Agnes, Hyperion, and other poems. Being in feeble health he was prevailed upon to try the climate of Italy, where he arrived in November, 1820, but he died in Rome in the month of February, 1821. His death has been attributed to the attacks of critics; and Byron in his Don Juan (11th canto), and Shelley in his Adonais, have spread and confirmed this notion; but it was in fact owing to a consumptive complaint of long standing. He was interred in the English burying-ground near the monument of Caius Cestius, and not far from the place where were soon after deposited the ashes of his poetical mourner Shelley. Keats was gifted with a rich imagination, keen sensibility, and a perfect ear for harmony. His poetry consists chiefly in a relation of luxurious sensations of sight, hearing, smell, taste, and touch. The poems are crowded with gorgeous images, beautiful thoughts, and wild absurdities. His later works are free of many of the faults of the earlier productions, and place him in the front rank of the poets of his age.

KEBLA. See Kaaba and Koran.

KEBLE, John, an English divine and poet, was born in 1792. He received his first education from his father, was sent to Corpus Christi College, Oxford, and took his bachelor's degree in 1810. Going to Oriel as a fellow, and occupying himself as a tutor, he made such progress in the university as to be appointed, first, public examiner, and then professor of poetry. He was preferred to the vicarage of Hursley, near Winchester, in 1836, a position which he held until his death, 22d March, 1866. The work by which he is best known is the volume of hymns entitled the Christian Year. He was also author of the Lyra Innocentium, and in conjunction with Dr. Newman, Rev. Mr. Froude, and others, of the

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Lyrica Apostolica. He was a zealous High Churchman, and was associated with Drs. Newman and Pusey in getting up the first series of the famous Tracts for the Times (1833). He published also the Psalms of David in English verse, Sermons on Primitive Tradition, an edition of Richard Hooker's works, with Life (1863), &c. He splendidly restored his church at Hursley entirely out of the profits of the Christian Year, a work that has seen more editions than that of almost any other contemporary poet.

KECSKEMET, or KETSKEMET, a market town, Hungary, 50 miles south-east of Pesth. It is one of the largest, if not the largest, of the market towns of the kingdom; and is poorly built, consisting of ranges of long, narrow streets of low houses. It has an extensive trade in horses and cattle, and five much-frequented annual fairs. The district around, which takes the name of the Kecskemet heath, is part of a vast sandy tract or steppe, stretching for about 200 miles through the counties of Pesth and Little Cumania, between the Danube and the Theiss. One may ride half a day in many parts of it without seeing a house or a tree. Pop. 44,887.

KEDGE, or KEDGER, a small anchor used to keep a ship steady and clear from her bower anchor, while she rides in a harbour or river, particularly at the turn of the tide, when she might otherwise drive over her principal anchor, and entangle the stock or flukes with her slack cable, so as to loosen it from the ground. The kedge-anchors are also used to transport a ship, or remove her from one part of a harbour to another, being carried out from her in the long-boat, and let go by means of ropes fastened to these anchors. They are also generally furnished with an iron stock, which is easily displaced for the convenience of stowing. See ANCHOR.

KEEL, the principal piece of timber in a wooden ship, and usually the first laid on the blocks in building. By comparing the carcass of a ship to the skeleton of a human body, the keel appears as the backbone, and the timbers as the ribs. The keel supports and unites the whole fabric, since the stem and stern posts, which are elevated on its ends, are in some measure a continuation of the keel, and serve to connect and inclose the extremities of the sides by transoms, as the keel forms and unites the bottom by timbers. The keel is generally composed of several thick pieces placed lengthways, which, after being scarfed together, are bolted and clinched upon the upper side. Iron vessels often want the keel.

False Keel, a strong, thick piece of timber, bolted to the bottom of the keel, which is very useful in preserving its lower side. The false keel is provided when the thick pieces which form the real keel cannot be procured large enough to give a sufficient depth thereto. In large ships of war the false keel is composed of two pieces, called the *upper* and *lower* false keels.

KEEL-HAULING, a punishment formerly inflicted for various offences, especially in the Dutch navy. It is performed by suspending the culprit by a rope from one yard-arm, with a weight of lead or iron upon his legs, and having another rope fastened to him, leading under the ship's bottom, and through a block at its opposite yard-arm. He is then suddenly let fall from the one yard-arm into the sea, where, passing under the ship's bottom, he is hoisted up on the opposite side of the vessel to the other. This punishment was not altogether unknown in British ships.

KEELSON, or KELSON, a piece of timber forming the interior or counterpart of the keel, being laid upon the middle of the floor timbers immediately over the keel, and serving to bind and unite the former to the latter, by means of long bolts driven from without, and clinched on the upper side of the keelson. The keelson, like the keel, is composed of several pieces scarfed together; and in order to fit with more security upon the floor timbers and crotchets, it is notched about an inch and a half deep, opposite to each of those pieces, thereby scored down upon them to that depth, where it is secured by spike-nails. The pieces of which it is formed are only half the breadth and thickness of those of the keel.

KEEP, in ancient military history, a kind of strong tower, which was built in the centre of a castle or fort, to which the besieged retreated and made their last efforts of defence. It is also called the *donjon*, or *dungeon*.

KEEPER OF MAGNET. A piece of soft iron placed in contact with two equal and opposite magnetic poles becomes magnetic, and tends to preserve the magnetism of the poles with which it is in contact. A horse-shoe magnet has generally a short straight keeper, which may be provided with a hook to suspend weights from. Two equal bar magnets are protected from loss of strength by being placed parallel to one another, their like poles pointing in opposite directions, a soft iron keeper connecting each pair of opposite poles.

KEEPER OF THE GREAT SEAL, so called because the sovereign's great seal is delivered into his custody. See CHANCELLOR.

KEEPER OF THE PRIVY SEAL, in England, is a lord by virtue of his office, through whose hands pass all charters signed by the king, before they come to the great seal.

KEHL, a town of Baden, at the confluence of the Kinzig and Schulter with the right bank of the Rhine, here crossed by a bridge of boats, and on the railway from Baden to Strasburg, opposite to the latter town, from which it was bombarded by the French garrison in August, 1870. It was once an important frontier fortress, and figures much in the wars between France and Germany; but its fortifications have been dismantled. It contains two schools, and has manufactures of carpets, wire-cloth, and tobacco; some transit trade, and a trade in wood. Pop. 2067.

KEIGHLEY, formerly KIGHLEY or KEITHLEY, a market town and municipal borough of England, in the county of York (W. Riding). It is 36 miles west by south of York, and situated in a deep valley, at the confluence of two rivulets, which here form a considerable stream, called the Worth, and flow into the Aire about ¾ mile below. The parish church is a spacious structure with a fine tower. The worsted manufacture is carried on extensively (Keighley being the headquarters of the worsted spinning trade), and there are several paper and corn mills. The machinery used in the factories is also for the most part manufactured in the town, where are also manufactured washing and sewing machines, mechanical tools, &c. Pop. 25,245.

KEITH, a market town of Scotland, partly in Banff, partly in Elginshire, on both banks of the Isla, 15 miles south-east of Elgin. It consists of three villages, Old Keith, New Keith, and Fife-Keith, the first irregularly built, the latter two neat and clean. Fife-Keith is on the left bank of the river, and connected by two bridges with Old Keith, with which New Keith is continuous. There is a factory for carding and spinning wool and the weaving of tweeds, a manure work, farming-implement manufactory, and grain and flour mills. There are a parish church and various other churches, and a public hall. Keith is the junction station of the Great North and Highland Railways. Pop. (1881), 4339.

KEITH, JAMES, a brave and experienced warrior, as well as an able and successful politician, field-

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marshal of Prussia, and the confidential friend of its sovereign. He was descended of a noble house in Scotland, being the youngest son of William Keith, earl-marshal of that kingdom, and was born 11th June, 1696. The breaking out of the rebellion, in 1715, developed his military propensities, and gave the colour to his fate. His mother, warmly attached to the house of Stuart, added her persuasions to the dictates of his own inclination, and at the age of nineteen he joined the Pretender's standard. The issue of the battle of Sheriffmuir, so unfortunate to the cause he had embraced, drove him into exile, being outlawed, and his property forfeited; he escaped from the conflict wounded and with difficulty, and effected a retreat to France. Here he applied himself with great diligence to the study of mathematics and military tactics, having previously made considerable progress in classical and general literature under the auspices of the celebrated Ruddiman. In 1717 he quitted Paris for Italy, whence he proceeded to Spain, in the capital of which kingdom he was fortunate enough to obtain the friendship of the Duke of Liria, who procured him a command in Ormond's Irish brigade. He subsequently accompanied his patron, when appointed ambassador to Russia, where, through the duke's recommendation, he obtained the rank of lieutenant-general from the czarina, who also conferred on him the order of the black eagle. In the Russian service he continued several years, distinguishing himself as well in the field as in the cabinet, during the wars with Turkey and Sweden. His military capacity was proved beyond dispute against both countries. In the revolution which ended by the elevation of the Czarina Elizabeth to the throne, he also took a prominent part; but at length he became tired of the Russian service and left it. On leaving Russia he went to Berlin, where Frederick the Great of Prussia, to whom his abilities were well known, received him with open arms, and raised him in 1747 to the rank of field-marshal of his forces, and in 1749 appointed him governor of Berlin. He made him also his confidential companion, selecting him as his associate in a tour which he made incognito through part of the north of Europe. In the subsequent wars of that martial monarch, Field-marshal Keith continued to display the greatest military talents as well as zeal in his service, contributing to the victories of Rossbach and Leuthen, and directing the siege of Olmütz in 1758, in which year his career was finally closed by a cannon-shot in the unfortunate battle of Hochkirch, October 14, 1758.—His eldest brother GEORGE (born in 1685), the tenth and last earl-marischal, had also to leave his native country for his connection with the rebellion of 1715, and after living with the Pretender at Rome for a considerable time, in Spain and elsewhere, finally went to Berlin to his brother. He also acquired the favour of Frederick, was sent as ambassador to Paris in 1751, and was made governor of Neufchâtel in 1754. He was subsequently able to make his peace with the British government, was reinstated in his titles and also obtained some estates. After a short visit to Scotland he returned to Prussia in 1765, and died at his seat near Potsdam in 1778.

KELAT, KALAT, or KHELAT, capital of Beloochistan, occupies the side of a hill 6000 feet above the sea; lat. 29° 8′ N.; lon. 65° 45′ E. It is in the form of an irregular oblong, surrounded by a mud wall flanked with bastions. The streets are filthy in the extreme, the houses wretched mud hovels with wooden frames, and the whole place has a very miserable appearance. On the west side, skirting the summit of the ridge, is the Miri, or Khan's Palace, an ancient and irregular pile of mud buildings, with flat terraced roofs. The manufactures consist chiefly of muskets and sword cutlery; but there is a considerable transit trade with Sind, Bombay, and Candahar. Kelat was stormed by the British in 1839, recaptured by insurgents from a weak garrison of Sepoys, and again taken by the British. Pop. about 12,000.

KELLERMANN, FRANÇOIS CHRISTOPHE, Duke of Valmy, marshal and peer of France, born at Strasburg, 28th May, 1735, entered the Conflans Legion as a hussar in 1752, and performed in it the first campaigns of the Seven Years' war. He went through all the degrees of service, up to the rank of *maréchal de camp*. At the breaking out of the revolution he so distinguished himself by patriotism and judgment, that the citizens of Landau, in the garrison of which he was stationed, presented him with a civic crown. At the commencement of the war he received the command of the army of the Moselle, formed a junction in September with the main army under Dumouriez, and sustained, September 20, 1792, the celebrated attack of the Duke of Brunswick. This cannonade of Valmy, as it is called, caused the allies to retreat, and perhaps decided, not merely the whole campaign, but also the fate of Europe, and the supremacy of France, till 1813. In the following wars of France Kellermann received various general commands. Napoleon loaded him with honours, and gave him Johannisberg. After the restoration of the Bourbons he was appointed a member of the chamber of peers, where he espoused the liberal side. He died September 12, 1820, eighty-five years of age. In his last will he ordered that his heart should be buried on the field of Valmy, which was done.

KELLS (originally *Kenlis*), an incorporated market town, Ireland, county Meath, picturesquely situated on a small hill near the Blackwater, 35 miles northwest of Dublin. It has straight, tolerably well-kept streets, a fine ancient church, with an elegant spire, and a handsome Roman Catholic chapel; near the church are the remains of an ancient round tower, in good preservation; and in the market-place a beautiful stone cross of the eighth century. Other public buildings are the courthouse, the fever hospital and dispensary, and the bridewell or house of correction for the county. Its principal trade is retail. In 550 a monastery was founded here by St. Columb. In 1156 the town, with its magnificent ecclesiastical edifices, was destroyed by fire. Having been restored it continued to rank as one of the principal towns in Meath, till the dissolution of its religious establishments. Its ancient charter dates from the 11th and 12th of Richard II. Pop. (1881), 2822.

KELP, in commerce, the crude alkaline substance obtained by burning sea-weeds. *Fucus serratus*, *F. vesiculosus*, *F. nodosus*, *Laminaria bulbosa*, *L. digitata*, the species chiefly used in the manufacture of this article, grow attached to rocks between high and low water mark. The sea-weed is cut close to the rocks during the summer season, and afterwards spread out upon the shore to dry, care being taken to turn it occasionally to prevent fermentation. It is then stacked for a few weeks and sheltered from the rain, till it becomes covered with a white saline efflorescence, and is now ready for burning. This is usually accomplished in a round pit, lined with brick or stone; but the more approved form for a kiln is oblong, about 2 feet wide, 8 to 18 long, and from 2 to 3 deep; the bottom of this is covered with brush, upon which a little dried sea-weed is scattered, and fire is applied at one extremity; the sea-weed is now thrown on gradually as fast as the combustion reaches the surface, and should there be much wind it is necessary to protect it by covering the sides with sods; after the whole is burned

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the mass gradually softens, beginning at the sides, when it should be slowly stirred up with a heated iron bar, and incorporated till it acquires a semi-fluid consistence. This part of the process requires considerable dexterity, and if the mass continues dry a little common salt should be thrown on, which acts as a flux. When cold it is broken up, and is now ready for sale.

The greater part of the soda used in soap-making, &c., was formerly obtained from kelp and barilla, and during the Napoleonic wars, and afterwards, when barilla and salt (the latter of which is now the most important source of soda) were highly taxed, kelp was largely manufactured in Ireland and Scotland, but more particularly in the Hebrides, where it was a source of support to many of the poorer inhabitants. In Scotland and its isles alone the total quantity annually made amounted to about 20,000 tons, the price of which ranged from £7 to £10 per ton. But when the duties on barilla and salt were reduced kelp-making received a complete check, and shores that formerly yielded the proprietors a rent of from £200 to £500 ceased to be worth anything. It was more particularly the repeal of the salt duty that stopped the kelp-making, as soda can be prepared so much more easily from salt than from kelp. Iodine (which see) is an important product of kelp. A ton of kelp yields about 8 lbs. of iodine. The richest known source of iodine is the sea-weed of Guernsey, and the utilization of this for the preparation of iodine may yet create an extensive industry in the island. Chloride of potassium may also be obtained in large quantities from kelp. The total quantity of kelp now made annually in the British Islands is stated to amount to about 10,000 tons. See BARILLA.

KELSO, a Scottish market town and burgh of barony in Roxburghshire, beautifully situated at the confluence of the Teviot and Tweed, on the left or north bank of the latter, which is crossed about 200 yards lower down by an elegant stone bridge of five arches, 38 miles S.E. of Edinburgh. It consists chiefly of five streets designed by Rennie, and converging towards a spacious square, used as a market-place; the houses are mostly of freestone, and in general handsome. It has a respectable town-house in the Grecian style; eight or nine churches, none of them remarkable; a number of good schools, a mechanics' institute, a museum, a public park, &c. Being situated in the midst of a populous and wealthy agricultural district its retail trade is large; pork-curing and coach-building are carried on to a considerable extent. In the outskirts of the town are the magnificent ruins of Kelso Abbey, founded and endowed by David I. in 1128 for Tyronensian monks. It is in the form of a Latin cross, and is a fine specimen of the early Norman style of architecture. It was twice burned during the contest between Bruce and Baliol; suffered severely at the hands of the English in 1523 and 1545, and what remained of its furniture and decorations was entirely destroyed during a popular tumult in 1560. The ruins were thoroughly repaired by the Duke of Roxburghe in 1866, and in 1874 the same nobleman greatly improved their surroundings, by opening up the view of the west front, and erecting an iron railing. In the immediate vicinity of the town also is Floors Castle, the seat of the ducal family of Roxburghe. Kelso was originally a kind of suburb to the ancient burgh of Roxburgh, destroyed by James II. in 1460, which stood on the opposite bank of the Tweed. It owes its rise to the foundation of the abbey. Pop. in 1881, 4687.

KEMBLE, CHARLES, a celebrated actor, was the eleventh child of Roger Kemble, and younger brother of the great tragedian, John Philip Kemble. (See KEMBLE, JOHN PHILIP.) He was born in Brecon, South Wales, on 25th November, 1775, and educated at the English Roman Catholic College at Douay, in France, in the department of Nord. On returning to England in 1792, through the influence of his brother he obtained a situation in the post-office; but the hereditary propensity for the stage was too strong to be overcome, and in 1794 he made his first appearance at Drury Lane as Malcolm to his brother's Macbeth. For a considerable time he continued to play secondary characters, but gradually improved in his profession. In 1800 he produced at the Haymarket Theatre his adaptation of Mercier's Deserteur, under the title of The Point of Honour, which achieved considerable success. In 1807 his play of The Wanderer, an adaptation from Kotzebue, and the following year his farce of Plot and Counterplot were both successfully brought on the stage—the former at Covent Garden, the latter at the Haymarket. As an actor his reputation continued to increase, and he gained special celebrity by the performance of such characters as Falconbridge, Edgar, Romeo, Charles Surface, Cassio, Don Felix, and Benedick. His impersonations were moreover greatly heightened by the physical advantages which he possessed of a fine voice, handsome features, and a tall athletic figure. About 1840 he was appointed to the office of examiner of plays, and shortly afterwards made his last appearance on the stage. He subsequently gave occasionally public readings from Shakspere. Mr. Kemble married, 2d July, 1806, Miss Marie Therèse de Camp, then a favourite actress in high comedy, and was the father of John Mitchell Kemble, the subject of the following article; Fanny Kemble, so well known both for her histrionic abilities and matrimonial misfortunes; and Adelaide Kemble, the celebrated opera singer. He died on 12th November, 1854.

KEMBLE, JOHN MITCHELL, son of the foregoing, and one of our most eminent Anglo-Saxon scholars, was born in 1807. He was educated at Trinity College, Cambridge, where he graduated, and having early directed his attention to the subject of the Anglo-Saxon language and history, took up his abode at Cambridge for a considerable time, employing himself in perusing and comparing the ancient MSS. deposited in the libraries of the university. The first-fruits of his researches appeared in 1833, in the publication of the Anglo-Saxon poem of Beowulf, the Traveller's Song, and the Battle of Finnesburgh, and the following year he issued a pamphlet on the History of the English Language, First or Anglo-Saxon period. He subsequently engaged in an edition of the Gospels in Anglo-Saxon, which, however, was never completed, and between 1839 and 1848 edited in seven octavo volumes, for the English Historical Society, a collection of all the known charters of the Anglo-Saxon period, under the title of Codex Diplomaticus Ævi Saxonici. In 1849 appeared his most valuable and best known work, The Saxons in England, in two volumes. Various other archæological works were edited by him. Mr. Kemble was for many years editor of the British and Foreign Review, and held also latterly the office of censor of plays. He had been appointed to arrange the British, Roman, and Anglo-Saxon antiquities for the Manchester Art Exhibition of 1857, and was engaged at Dublin collecting monuments of Celtic art, when he was suddenly cut off by inflammation of the chest, on 26th March of that year. He was a fellow of various learned societies, among others of the Academies of Sciences of Berlin and Munich, and the Historical Societies of Stockholm and Copenhagen.

KEMBLE, JOHN PHILIP, one of the most eminent tragedians of the British stage, was the eldest son of Roger Kemble, manager of a company of comedians

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at Prescot, in Lancashire, in which county he was born, 1st February, 1757. He received the rudiments of education at the Roman Catholic seminary of Sedgeley Park, Staffordshire. With the view of qualifying him for one of the learned professions he was afterwards placed by his father at the college of Douay, where he early distinguished himself by his proficiency in elocution. On his return to England, having completed his academical pursuits, he entered immediately upon the profession of an actor, for which he had long exhibited a decided predilection. At this period he produced a tragedy on the story of Belisarius, which was acted at Liverpool, and printed a volume of Fugitive Pieces in verse, with which he was, however, so dissatisfied, that on the day after their publication he destroyed every copy he could recover. Mr. Kemble appeared for the first time in London on the Drury Lane boards, September 30, 1783, in the part of Hamlet, and was received with great applause. It was not, however, till the retirement of Smith from the stage in 1788 that he took a decided lead in tragedy. He afterwards obtained the management of Drury Lane Theatre, which he enjoyed with only a short interruption till 1801. In 1794 he brought out a musical entertainment of his own, entitled Lodoiska, which had a great run. In 1802 he visited the Continent, and having passed twelve months at Paris and Madrid returned to London, when he purchased a sixth share in the Covent Garden Theatre from Mr. Lewis for £24,000 and became manager of that establishment. Here he continued his career with great success, till the destruction of the theatre by fire in 1809. In the autumn of the same year the new edifice which had been constructed opened with an increase of prices, which, together with certain obnoxious arrangements in regard to the private boxes, created for a series of nights the disturbances known by the name of the *O P riots*. Mr. Kemble took his farewell of the stage July 23, 1817, on which occasion he was complimented with a public dinner at the Freemasons' Tavern, Lord Holland occupying the chair, and other honourable tokens of esteem; and shortly after retired to the Continent, where he died at Lausanne, in Switzerland, February 26, 1823, of a paralytic attack after a few hours' illness. As an actor Kemble was distinguished for dignity, precision, and studious preparation. His merits were differently appreciated, but by all he was regarded as a highly gifted actor, and the impression which he made in characters more immediately adapted to his style of excellence, such as Cato, Coriolanus, Hamlet, John, Jaques, Penruddock, was very great.

KEMPIS, Thomas à. See Thomas à Kempis.

KEN, Thomas, a learned and pious dignitary of the English Church, was born at Berkhamstead, Herts, in 1637, and educated at Oxford. About 1679 he went to Holland to officiate as chaplain to the Princess of Orange, and afterwards to Tangier, as chaplain to the Earl of Dartmouth. In every station which he held he exhibited a conscientious propriety of conduct and unyielding morality, which procured him the respect of the licentious court of Charles II., and, strange as it may appear, conciliated the favour of that profligate prince. Dr. Ken became a chaplain to Charles II., in whose reign he was made Bishop of Bath and Wells. He was one of the seven bishops sent to the Tower for resisting the dispensing power claimed by King James, and for petitioning in behalf of their own and the people's rights. After the Revolution Bishop Ken refused to take the oath of allegiance to King William, in consequence of which he was deprived of his preferment. He was, however, highly respected by those of opposite sentiments, and Queen Anne bestowed on him a pension. He died at Longleate, 19th March, 1711. His works, consisting of sermons, poems, &c., were published in four vols. 8vo, 1721, with an account of his life.

KENDAL, or Kirkby-Kendal, a parliamentary borough and market town of England, county Westmorland. It is agreeably situated in a valley, 18 miles S.S.W. Appleby, on the right bank of the Kent, here crossed by one iron and three stone bridges, and on the Windermere branch of the London and North-Western Railway. It consists of three principal streets, one of which is upwards of 1 mile long, and several subordinate streets or lanes leading to the suburbs, where a large number of houses in streets and terraces have been built, commanding beautiful views of the vale. It has an elegant town-hall and assembly-rooms; an ancient but large parish church, a free grammar and other schools, a widows' and an old maids' hospital, news-room, mechanics' institution and library, natural history society, with a valuable museum, &c. Linseys, serges, kerseys, carpets, railway rugs and wrappers, trouserings, knitted woollen jackets and caps, are extensively manufactured; and there are also in the town and its immediate neighbourhood manufactories of tortoise-shell and other combs, paper, gunpowder, and wool cards, also corn-mills. Kendal is also famed for its fish-hooks. The town was enfranchised by the Reform Act of 1832, and returns a member to the House of Commons. It is one of the oldest manufacturing towns in the kingdom, some Flemish weavers having settled here in the time of Edward III. Pop. 13,697.

KENILWORTH, a town of England, in Warwickshire, 4 miles north of Warwick. It consists chiefly of one street, extending along the turnpike-road for more than 1 mile. It has an ancient and venerable church, with a square tower, surmounted by a spire, and a district church dedicated to St. John has recently been erected. The comb trade used to flourish here, but is now almost extinct, and Kenilworth is now the centre of an agricultural district. Kenilworth Castle, now a magnificent ivy-covered ruin, was founded in the reign of Henry I., and in 1286 was the scene of a grand chivalric meeting, at which, it is alleged, silks were worn for the first time in England. The gorgeous entertainment given here in 1575 to Queen Elizabeth by the Earl of Leicester is familiar to all from Scott's romance of Kenilworth. During the civil wars the castle was seized by Cromwell and given to some of his officers, by whom it was reduced to its present ruinous state. Pop. 3335.

KENNEDY, Grace, an authoress of religious novels, was a native of Ayrshire, and born in 1782. Her principal works are Decision, Father Clement, Anna Ross, Dunallan, along with some others. They were not acknowledged as her productions till after her death. They have been translated into French and other foreign languages. Miss Kennedy passed the greater part of her life in Edinburgh, and died on the 28th February, 1825. A collective edition of her earlier works was published in six vols. 12mo.

KENNICOTT, Benjamin, D.D., professor of theology at Oxford, was born in 1718 at Totness in Devonshire, where his father was a poor shoemaker and sexton. He is best known by his edition of the Hebrew text of the Bible, to which was annexed a collection of readings from about 580 manuscripts, and twelve printed editions of the Hebrew. In this laborious and expensive undertaking Kennicott was assisted by a subscription of several thousand pounds, and thus enabled to send several scholars to Spain, Italy, Germany, &c., to collate manuscripts and editions. The work has many typographical errors.

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The author's plan, too, was defective, and he was not sufficiently acquainted with the eastern languages and the true principles of criticism; but he rendered great service to the cause of science and religion by opening the way in this department of biblical criticism. He died in 1783. At the time of his death he was employed in preparing Remarks on Select Passages in the Old Testament, which were subsequently published. Kennicott's work is the most splendid edition of the Hebrew Scriptures ever published.

KENSINGTON, once a village 3 miles west from London, now a suburb of that metropolis. It is well known for its royal palace and gardens. In former times Kensington Palace was a favourite royal residence; and King William III., Queen Mary, Queen Anne, and George II. died here. Kensington Gardens, attached to the palace, are much frequented as a fashionable promenade in summer, and form a great ornament to the metropolis. These gardens contained originally 26 acres, and 20 acres were added by Queen Anne. They now cover about 350 acres. The Kensal Green Cemetery here contains 54 acres. Pop. 162,924.

KENT, a maritime county of England, bounded N. by the Thames and German Ocean, E. and S.E. by the latter and the Strait of Dover, S. by the English Channel and Sussex, and W. by Surrey; and having, on its E. and S. coasts the North and South Forelands and Dungeness. Area, 995,392 acres, of which 940,000 are arable, meadow, and pasture. On that part of the coast bounding the estuary of the Thames there are numerous examples both of the gain and loss of land by the sea. The cliffs on the Isle of Sheppey, which is situated here, and which are from 60 to 80 feet high, decay rapidly, 50 acres having been lost in twenty years, between 1810 and 1830; and the church at Minster, now near the coast, is said to have been in the middle of the island in 1780. Similar ravages are going on at other parts of the coast. Off the east shore lie the well-known Goodwin Sands (which see), between which and the mainland is the equally well-known roadstead called the Downs. Kent may be designated a hilly country, being divided by two nearly parallel chains of chalk hills, which traverse the county west to east, terminating in lofty chalk cliffs at Dover, Folkestone, and Hythe. Many of these hills rise from 400 to 650 feet above sea-level. The district between the chalk range and the estuary of the Thames is mostly occupied by the plastic clay which immediately overlies the chalk. The space, again, south from the range, or between it and Sussex, is called the Weald, and was anciently an immense forest. This portion of the county comprises Romney Marsh, which occupies its south-east corner, and consists of about 24,000 acres. The climate of Kent is in general mild and genial. The soil may be divided into the gravel, chalk, and clay, which produce, where they mix in due proportion, an extremely fertile loam. The alluvial soils along the Thames and Medway, and in Romney Marsh, produce some of the richest pastures in the kingdom. Generally speaking, the soil of the east division is believed to be superior to that of the west. Agriculture, particularly in the former, is in a very advanced state. Kent is the principal hop county in England; and wheat, barley, pease, and beans are raised in large quantities. In 1882 there were 220,054 acres under corn crops (wheat 87,984 acres), 85,697 under green crops, and 41,636 under hops. The Weald contains a great deal of natural grass-land, producing a vast quantity of excellent hay. The pastures in the marshes are of considerable extent, and are appropriated to the fattening of cattle and sheep, the latter including a peculiarly fine breed, known as the Romney Marsh sheep, which fattens early, and produces long combing wool. Poultry of every sort is large and fine; and game, including hares, pheasants, and partridges, numerous; the pheasants being esteemed the largest and finest-flavoured in the kingdom. The principal towns in Kent are Canterbury, Rochester, Chatham, Greenwich, Deptford, Woolwich, Gravesend, Dover, Maidstone, Folkestone, Hythe, &c., all of which are connected with each other and with London by railway. Paper of all kinds is manufactured in the county, but the writing-papers are more especially noted for their quality; cotton manufactures, to a limited extent, are likewise carried on; and there are salt, copperas, and calico-printing works, bleachfields, and gunpowder-mills. Julius Cæsar's first landing in Great Britain was in Kent. Kent returns twenty-one members to Parliament, of which six are for the county, which is formed into three parliamentary divisions. Pop. in 1871, 848,294; in 1881, 977,706.

KENT, WILLIAM, an ingenious artist, was born in Yorkshire in 1685. He was apprenticed to a coach-painter, but, conscious of superior talent, repaired to London, where he was enabled by some gentlemen to reside in Rome, and study painting under Cavalier Luti. In this art, however, he never obtained celebrity: his talent lay chiefly in ornamental architecture, some specimens of which at Holkham, Stowe, and other places, are much admired. He is regarded by Horace Walpole as the founder of the modern school of landscape-gardening, which he rendered more natural, graceful, and pleasing. He leaped the sunk fence, says the last-mentioned writer, and saw that all nature was a garden. He broke up the old uniformity of straight lines and corresponding parts, and threw wood, water, and ground into the beautiful shapes presented by nature. The taste of Pope is supposed to have aided that of the artist. He died at Burlington House in 1748, aged sixty-three, and was buried at Chiswick. He executed the Shakspere monument in Westminster Abbey.

KENTIGERN, ST. See MUNGO (ST.)

KENT'S HOLE, a cavern near Torquay, Devonshire, in which have been found many bones, similar to those described in Dr. Buckland's Reliquiæ Diluvianæ.

KENTUCKY, one of the United States, bounded N. by Ohio and Indiana, N.W. by Illinois, W. by Missouri, S. by Tennessee, and E. by Virginia and West Virginia; greatest length, E.N.E. to W.S.W., about 400 miles; breadth, 170 miles; area, 40,400 square miles. The surface, though somewhat mountainous in the south-east, has in general little elevation, and may be considered as an inclined plane, sloping gradually towards the Ohio on the north, and the Mississippi on the west. The greater part of the state is gently undulating, and possesses an excellent soil, either covered with forest, in which the black walnut, black cherry, buckeye, sugar-maple, mulberry, elm, ash, cotton-wood, and white thorn are prevailing trees; or under regular cultivation, producing excellent crops of wheat, tobacco, and hemp, which are the staple productions, and also abundance of Indian-corn, rye, oats, barley, buckwheat, flax, and potatoes. The most common fruits are apples, pears, peaches, and plums; and the pastures rear vast numbers of horses, horned cattle, sheep, and swine. The vine grows wild, and is partially cultivated; the cotton plant also thrives well, and a large quantity of sugar is produced. Few states are better provided with water communication. The Ohio forms the boundary on the north and north-west for 637 miles, and receives from within the state numerous tributaries, of which the most important are the Cumberland, Kentucky, and Tennessee; the Mississippi, after

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receiving the Ohio, forms the boundary on the west. The state is also provided with an efficient system of railways. The most valuable mineral products are iron, coal, salt, and lime. The last is found in almost every part of the state, at the depth of about 8 feet below the surface, and forms the predominant geological formation, often presenting stupendous precipices along the banks of the rivers, and containing numerous remarkable caverns, among them the celebrated Mammoth Cave. The manufactures of this state are not very largely developed. Besides domestic manufactures, they consist chiefly of woollen and cotton goods, iron and ironware, gunpowder, leather, soap, and spirits; and the most important articles of trade are grain, tobacco, hemp, salt, sugar, live-stock, bacon, and lard. Kentucky originally formed part of Virginia, but was separated from it in 1789, and admitted into the Union in 1792. The seat of government is Frankfort, but the oldest and finest town is Lexington; and the largest and most commercial, Louisville. Pop. in 1880, 1,648,690.

KEOKUK, a town, United States, Iowa, at the south-east corner of the state, at the foot of the lower rapids of the Mississippi, 2 miles above the confluence of the Des Moines, 205 miles above St. Louis. It is built partly at the foot and partly on the summit of a limestone bluff about 150 feet high, and has broad regular streets with many handsome houses. It has a public school occupying a very handsome edifice, a medical college, a female seminary, and a number of academies. The industrial establishments number about fifty, and the trade, chiefly in flour and lumber, is very active. Steamers ply daily to St. Louis. Pop. (1880), 12,117.

KEPLER, JOHN, a great mathematician and astronomer, to whom astronomy is indebted for much of its present perfection, was born December 21, 1571, at Weil in Würtemberg, and was descended from a noble family. Poverty and the vicissitudes of his father's fortune, who was reduced to the necessity of being an innkeeper, were the causes of the neglect of his education and of the unhappiness of his youthful days. But in his eighteenth year, after the death of his father, he left the monastic school of Maulbrunn, and succeeded in entering the University of Tübingen. Here he studied the course then prescribed—first philosophy and mathematics, and then theology. He also indulged his inclination for astronomy, and devoted himself especially to the investigation of the physical causes of the motion of the celestial bodies. From Tübingen he was invited in 1593 to become professor of mathematics and morals at Gratz in Styria, where he pursued his astronomical studies. For the sake of freedom of conscience he fled to Hungary, but returned some time after. Kepler in the interim had contracted an unhappy marriage, which embittered still more a life which had never wanted its proportion of sorrows. Meanwhile the astronomer Tycho de Brahe had come to Germany, his acquaintance with whom had an important influence on Kepler's life. He resolved to relinquish his situation, and to prepare at Prague, with Tycho, the famous Rodolphine tables, called after the reigning Emperor Rodolph, which were first printed at Ulm in 1626, and which Lalande (Ast. i. p. 474) calls an 'Ouvrage essentiel, et qui fut le fondement de tous les calculs de l'astronomie pendant un siècle.' At Tycho's recommendation he was established in that place; but as his office and science did not afford him a subsistence, he studied medicine in order to gain a livelihood by the practice of it. The emperor had assigned him a salary, but in the period of trouble which preceded the Thirty Years' war it was not paid. Controversies with the clergy, and the disturbed state of the Austrian dominions, made his situation very uncomfortable. He left Lintz, repaired to Ratisbon, declined an invitation to England, and was confirmed by the succeeding emperor, Ferdinand, in the office of imperial mathematician, and afterwards went to Ulm in order to print his Rodolphine tables. In 1627 he returned to Prague, and received from the emperor 6000 guilders. He finally became a professor at Rostock on the recommendation of Albert, duke of Wallenstein, at that time Duke of Mecklenburg, but did not receive the promised compensation. He therefore went to Ratisbon, where he died 15th November, 1630. 'Kepler,' says Lalande, 'is as famous in astronomy, for the sagacious application which he made of Tycho's numerous observations (he was not himself an observer), as the Danish astronomer for the collection of such vast materials.' The laws of the courses of the planets, deduced by Kepler from those observations, are known in astronomy under the name of the *three laws of Kepler*, and on them were founded Newton's subsequent discoveries, as well as the whole modern theory of the planets. (See KEPLER'S LAWS.) Kepler's services in the cause of astronomy have placed him high among the most distinguished men of science on record. In Ratisbon a monument was erected to his memory in 1808 by Charles Theodore von Dalberg. It consists of a Doric temple, in which is placed the bust of Kepler. The most important of his works is his Astronomia nova, seu Physica Cœlestis tradita Commentariis de Motibus Stellæ Martis (Prague, 1609, folio), a work which secures immortality to the author, and is still regarded as classical by astronomers.

KEPLER'S LAWS, three laws discovered by Kepler (see Sketch of the Progress of Physical Science, and also KEPLER):—1. Every planet describes an ellipse, the sun occupying its focus. 2. The radius vector (line joining the centre of the sun with the centre of the planet) of each planet sweeps out equal areas in equal times. 3. The squares of the periodic times (the periods of complete revolution round the sun) of two planets are proportional to the cubes of their mean distances from the sun. These laws were discovered from calculations on Tycho Brahe's observations; they enabled Newton to determine the laws of the attraction of gravitation.

KEPPEL, AUGUSTUS, a British admiral, born 2d April, 1725, was the second son of William, earl of Albemarle, entered the sea service at an early age, and accompanied Admiral Anson round the world (1740–45). After being much engaged in the service of his country, both as a diplomatist and in the more especial duties of his profession, and after having sitten in Parliament as member for Chichester, he rose rapidly through the successive grades of his profession, and in 1778 was appointed to the command of the Channel fleet. July 27 in that year he fell in with the French fleet under Count D'Orvilliers, off Ushant, when a short but warm engagement ensued. A short delay becoming necessary to repair damages, when that labour was accomplished the admiral made signal for his van and rear divisions to assume their proper stations. Sir Hugh Palliser, commanding the rear, took no notice of the signal, and refused to join his commander, until night prevented a renewal of the battle. The conduct of the rear-admiral being fiercely attacked, and Keppel refusing a disavowal of the charges brought against him, Palliser immediately exhibited articles of accusation against him. Keppel was honourably acquitted, and received the thanks of both houses of Parliament for his services. Palliser was next tried, and reprimanded; but the public indignation was so great that he was obliged to resign his seat in the House of Commons, and to vacate several offices which he held under govern-

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ment. In 1782 Admiral Keppel was raised to a peerage under the title of Viscount Keppel, Baron Elden, and was at two different periods appointed first lord of the admiralty. He died in October, 1786, unmarried. He was regarded as very able in his profession, and a man of great integrity and humanity.

KERATIN (from Gr. *keras*, a horn), a substance obtained from claws, feathers, hair, horn, nails, wool, and other epidermal appendages. Whether or not there is a single definite substance obtainable from those sources is doubtful, for although the residue which is got after exhaustion with water, alcohol, ether, and other solvents, is pretty uniform in composition, there are some discrepancies. However, the approximate ultimate composition is carbon, 50–52; hydrogen, 6–7; nitrogen, 16·2–17·7; oxygen, 21–25; sulphur, 0·7–5. This body, whether it be definite or a mixture, is connected with albumen, both in general composition and also in the way it decomposes when under the action of different reagents. Thus alkalies dissolve and decompose it, dilute sulphuric acid converts it into *leucin* and *tyrosin*, nitric acid colours it yellow. This tissue or substance is distinguished from gelatinous tissue by becoming soft when acted on by water for some time, but no glue is produced. It is insoluble in alcohol and in ether.

KERATOSA, the name given by Dr. Bowerbank in his classification of the Sponges to the order or group of Horny Sponges—of which the familiar sponge of commerce is a good example—in which the skeleton is composed of the horny fibres of a substance known as *keratode*. This keratode is analogous in composition and nature to horn; and in these sponges the skeleton of keratode is generally more or less strengthened and supported by little spicules or needle-like bodies of flint or lime.

KERGUELEN'S LAND, or DESOLATION ISLAND, in the Indian Ocean; lat. (west point) 49° 3′ S.; lon. 69° 13′ E.; length, 100 miles; greatest breadth about 50 miles. It has a remarkably barren and desolate appearance, consisting of lofty masses of basalt and other volcanic rocks, which rise to the height of 2500 feet, presenting numerous bold headlands and ranges of precipitous cliffs, and possessing a very scanty vegetation. Sea-fowl are numerous, but no land animals are known to exist on it. Its indentations furnish several bays and inlets affording good harbours. Of these the most remarkable is Christmas Harbour, at its north extremity.

KERMAN, KIRMAN, or SIRGAN, a town in Persia, capital of a province of the same name, at the western extremity of an extensive plain; lat. 30° 45′ N.; lon. 56° 25′ E. It is surrounded by a mud wall and defended by a citadel containing the palace of the beglerbeg; and has numerous mosques, baths, caravanserais, and a well-furnished bazaar. Its manufactures consist of camels'-hair shawls, carpets, and muskets, and its trade is considerable, though far less than it was before the decay of the port of Gombroon and the rise of that of Bushire. Pop. estimated at 30,000. The province of Kerman, in the south-east of Persia, has an area of 50,000 square miles and a population of 600,000. In the north and north-east is the desert of Kerman, in which whole armies are said to have perished. In the east and south the soil is very fertile. The date and the grape grow to perfection in parts, and considerable attention is paid to the silkworm.

KERMANSHAH, or KIRMANSHAH, a town in Persia, province of Irak-Ajemi, near the right bank of the Kherah, 280 miles W.S.W. of Teheran. It occupies two or three small hills at the western extremity of a broad plain, and is surrounded by a mud wall with five gates, but is in general very poorly built. The only buildings deserving of notice are the principal mosque and the bazaar. The manufactures consist chiefly of carpets and muskets, and the trade, chiefly transit by the routes from Bagdad, Shuster, and Ispahan, by way of Hamadan, which all centre in it, is considerable. Pop. about 35,000.

KERMES, in zoology. See COCCUS.

KERMES MINERAL. This name is given to amorphous antimony trisulphide. (See ANTIMONY.) The native antimony trisulphide occurs in well-developed trimetric prisms. When this compound is fused for some time, and suddenly thrown into cold water, its crystalline structure is entirely destroyed. The more general method of preparing kermes consists in dissolving pulverized native antimony sulphide in caustic potash solution, and precipitating the amorphous sulphide from this solution by the addition of an acid. This amorphous sulphide is then dissolved in sodium carbonate solution, from which liquid kermes precipitates on cooling. As thus prepared this substance contains varying amounts of antimony oxide, and sometimes also potassium sulphantimonate, mixed with antimony trisulphide.

Kermes is a brown-red powder, becoming blackish-gray when washed with boiling water. By fusion it may be obtained as a solid mass, but it is totally devoid of crystalline structure.

KERRY, a maritime county of Ireland, on the south-west coast, in the province of Munster, bounded north by the estuary of the Shannon, east by Limerick and Cork, south by Cork and Kenmare estuary, and west by the Atlantic; greatest length, 60 miles, north to south; breadth, 58 miles; area, 1,185,918 acres, of which in 1880, 160,173 were under crops. On the west and south it is rugged and mountainous, with deep valleys intervening; but the north and east are remarkable for their fertility. Some of the mountains rise to considerable elevations; Carn Tual, the highest in Ireland, attaining a height of 3404 feet above sea-level, while several others reach 2000 and 3000 feet. These mountains are chiefly composed of red or gray conglomerate and sandstone, supporting flanks of silicious flags, and overlaid in the low districts by fields of limestone. Iron-ore abounds in some of the mountains, and copper and lead also exist in the county. The subsoil is slate and red sandstone, with limestone in the low districts. Slate of a superior kind and flag-stone are obtained in great quantities in the Island of Valentia, on the south-west coast. The coasts of Kerry are remarkably and deeply indented with bays and inlets, the principal of which are the Bays of Tralee, Brandon, Dingle, Ballynaskellig, and the estuary called Kenmare River. There are several considerable rivers in the county, and several beautiful lakes, including those of Killarney, inclosed on all sides by mountains, and though small, singularly picturesque. The climate is mild and moist; the arbutus flourishes in the open air, and vegetation generally is extremely luxuriant in the central parts, where the soil also is remarkably fertile, producing large crops of grain, and containing some excellent pasture land. Oats and potatoes are the principal crops, though barley, bere, rye, wheat, turnips, &c., are also grown; but agriculture generally is in a wretched state. The Irish language is almost universally spoken in this county, and ancient customs and superstitions preserve their ascendency in a remarkable degree. The chief trade consists in exports of agricultural produce, mostly oats and butter. Kerry returns three members to Parliament —two for the county, and one for the borough of Tralee. Principal towns, Tralee and Killarney. Pop. in 1841, 293,880; in 1881, 201,039. Between the 1st of May, 1851, and the 31st of December, 1877, 112,350 persons emigrated from the county.

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KERTCH, or KERCH (ancient *Panticapaeum*), a town of Russia, in the Crimea, on a tongue of land forming a peninsula of the same name, on the Strait of Yenikale, connecting the Sea of Azof with the Black Sea. It is regularly and beautifully built, chiefly of stone obtained from the fine quarries of the neighbourhood, and possesses great natural advantages for commerce. The greater part of the inhabitants are employed in commerce. It exports building-stone and large quantities of salt, obtained from neighbouring lakes, and its herring and sturgeon fisheries are very productive. Its site is that of the ancient Panticapaeum, the residence and burial-place of Mithridates. The modern town is of very recent existence, and has risen up as if by magic; and by its increase has prejudicially affected some of the other ports. It was taken by the Anglo-French forces on May 25, 1855, and its catacombs were plundered of a valuable collection of early Greek antiquities. Pop. 22,449.

KESSELS, MATTHIAS, one of the best of modern statuaries, born at Maestricht, 20th May, 1781; learned first to be a goldsmith, then became a modeller, and studied in Paris, Hamburg, St. Petersburg, and Rome, where, in the studio of Thorwaldsen, and after his models, he executed two beautiful reliefs of Day and Night. He also executed numerous works of his own, beginning with a St. Sebastian, which gained him the prize instituted by Canova. Among his other more remarkable works are a Cupid sharpening his Arrow, a bust of Admiral Tromp, and above all, a colossal scene from the Deluge, which is the most celebrated. His style is pure, vigorous, and entirely free from mannerism. He died at Rome, whither he had returned in 1818, 3d March, 1831, in the full vigour of his life.

KESTREL. See FALCON.

KESWICK, a market town, England, in the county of Cumberland, 22 miles south-west of Carlisle, most romantically situated on the Greta, in a valley surrounded by hills. It has many neat and commodious dwellings, a market-house, and a handsome church in the early English style. Coarse woollens are manufactured to some extent, as are likewise black-lead pencils, but the black-lead mines of the neighbourhood are now practically exhausted. The inhabitants, however, depend chiefly upon the visitors to the Lake of Derwentwater and the romantic scenery in the neighbourhood. At Greta Hall, in the immediate vicinity, Robert Southey spent the latter years of his life, and died in March, 1843. Pop. (1881), 5935.

KETCH, a vessel of the galliot kind, equipped with two masts, namely, the main-mast and the mizzen-mast, and usually from 100 to 250 tons burden. Ketches were principally used as yachts for conveying princes of the blood, ambassadors, or other great personages from one place to another. Ketches were likewise used as bomb-vessels, and were therefore furnished with all the apparatus necessary for a vigorous bombardment.

KETCHUP, or CATSUP, Mr. Todd defines as 'a kind of Indian pickles imitated by pickled mushrooms.' The name is said to be of eastern origin, and to come from *kitjap*, the Japanese for a similar condiment. Dr. Kitchener, in his Apicius Redivivus, devotes ten pages to different varieties of receipts for this sauce. There we may become acquainted with the composition and virtues of numerous catsups, whether they be walnut, mushroom, quintessence of mushroom, quintessence of oysters, cockle, mussel, tomato, white cucumber, or pudding. 'Mushroom gravy,' says the doctor, 'approaches the flavour of meat gravy more than any other vegetable juice, and is the best substitute for it in meagre soups and *extempore* gravies.' Again, 'What is commonly called *catsup* is generally an injudicious composition of so many different tastes, that the flavour of the mushroom is overpowered by a farrago of garlic, shallot, anchovy, mustard, horse-radish, lemon-peel, beer, wine, and spices. Ready-made catsup is little better than a decoction of spice and salt and water with the grosser part of the mushrooms beaten up into a pulp.' From the great competition in the manufacture of ketchup, there is a want of care in the selection of the fungi; and as many of the species are poisonous, the use of this condiment is sometimes attended with danger.

KETTERING, a market town, England, in the county of Northampton, 13 miles north-east of Northampton, and a station on the Midland main line. It has an elegant church in the Perpendicular style, with a lofty tower and spire; places of worship for various Dissenting bodies; a grammar and other schools. Boot and shoe making is the staple trade, giving employment for probably one half of the population; besides which tanning, currying, and the manufacture of agricultural implements are carried on. There is a handsome town-hall, cattle-market, a corn exchange, dispensary, temperance hall. Kettering is the centre of the ironstone district of the county, and daily sends thousands of tons of ore into Wales, Derbyshire, and Yorkshire, besides having several smelting-furnaces in the neighbourhood. Pop. 11,095.

KETTLE-DRUM. See DRUM.

KEW, a small village in the county of Surrey, is situated on the right bank of the Thames, opposite Brentford, with which it is connected by a bridge, 6 miles west from Hyde Park Corner, and 1½ mile from Richmond. The royal botanic gardens and the connected pleasure-grounds (belonging to the nation), the former covering about 75 acres, the latter 250, are the chief attraction of visitors to Kew. Their situation is low, and commands no prospects; but they contain the finest collection of plants in the world, and are decorated with various ornamental buildings, including a Chinese pagoda 163 feet high. The botanical constructions here are really magnificent, and have been much augmented in recent years by means of liberal grants of the public money; they include a great conservatory for palms, tree-ferns, and other tropical plants, 362 feet long altogether, the centre portion being 137 feet 6 inches long, 100 feet wide, and 69 feet high, the wings 50 feet wide and 33 feet high; a house for succulent plants, such as cactuses, euphorbias, &c., 200 feet long and 30 wide; a great 'temperate house' for trees and shrubs of temperate climates that require protection during the winter; a large orangery, hothouses, greenhouses, &c., of great size. The gardens are open to the public on Sundays as well as week days. It is only since 1842, when they were placed under the superintendence of Sir William Jackson Hooker, that they have attained their present magnificence. The annual number of visitors, which in 1841 was only 9174, now amounts to 500,000, and sometimes as many as 14,000 visit the gardens in a single day. Connected with the gardens is a museum and a herbarium, including some splendid collections of preserved plants.

KEY, or KI, a group of islands in the Indian Archipelago, about 50 miles west of the Arru Islands, and about 70 miles from the south-west coast of New Guinea; lat. 5° 30′ S.; lon. 128° E. They consist of the Great and Little Keys, Keywatela, Verdool, Ketember, and a few other coral islets. They have rather an elevated surface, and are covered with rich and luxuriant vegetation. The Great and Little Keys are annually visited by coasting vessels from the Moluccas, Macassar, Boni, and the Timor

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group, for the purchase of trepang, tortoise-shell, birds'-nests, &c.

KEY, or KEY-NOTE, in music, the principal or fundamental note or tone, to which the whole of a movement has a certain relation or bearing, to which all its modulations are referred and accommodated, and in which it both begins and ends. See MUSIC.

KEYS are certain sunken rocks lying near the surface of the water, particularly along the shores of Honduras, Central America, and the West India Islands, from the Spanish *cayo* (an islet, rock).

KEY-STONE, the middle voussoir of an arch or vault, that placed at the top or vertex of an arch to bind the two sweeps together. This, in the Tuscan and Doric orders, is only a plain stone projecting a little; in the Ionic it is cut and waved somewhat like consoles; and in the Corinthian and Composite orders it is a console enriched with sculpture. The best architects make the length of the key-stone $\frac{1}{7}$ or $\frac{1}{12}$ of the span of the arch.

KEY WEST, a small island belonging to the United States, and forming part of Florida, from the southern point of which, Cape Sable, it is 60 miles distant to the south-west. It is 4 miles long, and 1 broad, and is not more than 20 feet above the level of the sea. It is of coral formation, with little available soil. On this island is situated Key West City, a port of entry, military station of the United States, and capital of Monroe county, occupying an important position as the key to the Florida Pass and the Gulf of Mexico. The harbour is safe, and easily accessible. Its entrance is defended by a fort. The chief occupations of the inhabitants are the salvage of vessels, salt-making, and sponge-fishing. Pop. 9890.

KHAN, the Turkish name for caravansary. The caravansaries in towns are of two kinds, those for travellers and pilgrims, where a lodging is furnished gratis; and those for traders, which are usually handsomer and more convenient, and have doors to the apartments, which are well secured, but a small charge is made for each chamber, usually not more than a halfpenny or a penny per day. There is also a *droit* of entry, which is more considerable, and a duty on whatever is sold in the caravansary. These establishments belong either to government or to private individuals, and each is appropriated to some particular country, or to the dealers in some particular kind of merchandise.

Khan is also the title of an officer in Persia, answering to *governor* in Europe, and added after his name. There are khans of countries, provinces, and cities, who have different additions to distinguish them. In the north of Asia this title expresses the full regal dignity.

KHARKOV, CHARKOV, or SLOBODISCH UKRAINE, a government of the south of Russia, bounded north by Kursk; west and south-west, Poltava; south, Ekaterinoslav; east, Voronej; area, about 17,450 square miles. The country is for the most part open, the woodland covering only a few spots; soil dry, partly of a strong and loamy, partly of a light and sandy nature, but usually fertile. The climate is very mild, though the winter is rather severer than is usual in the same latitude, in consequence of there being no shelter from the north wind. Summer is often very hot. Agriculture is carried on to a considerable extent; and, with the rearing of bees, cattle, and horses, forms the chief employment of the inhabitants. Principal towns, Kharkov (capital), Akhtirka, Bogodoukhof, &c. Pop. 2,027,165.

KHARKOV, or CHARKOV, a town of Russia, capital of the above government, 400 miles S.S.W. Moscow, at the confluence of the Kharkov and Lopan. It is not well built, the streets being narrow, crooked, and without pavement; and the houses mostly of wood, which, however, from being whitewashed, have a gay, cleanly appearance. It contains a cathedral, and nine other churches; two convents, a university, with a library of 21,000 volumes; a museum, and botanical garden. The inhabitants carry on a considerable trade in soap, candles, and leather. Pop. 101,175.

KHARTOOM, or KARTOOM, a town of Nubia, on the Bahr-el-Azrek, within 2 miles of its junction with the Bahr-el-Abiad, the two main branches of the Nile. It has sprung rapidly up since 1830, so as to become the capital of Senaar, and the largest town in East Soudan. It is a straggling place, with very irregular streets, and houses constructed of millet stalks so as to look like small corn stacks. The principal buildings are a mosque, built of burned bricks, a military hospital, and a bazaar. The central situation of Khartoom, at the junction of two large rivers, and on the highway from Abyssinia, Senaar, and Kordofan to Egypt, makes it the emporium of a very extensive trade. Pop. about 25,000.

KHATMANDU, a town in North Hindustan, capital of the Kingdom of Nepál, on the left bank of the Bogmutti, on an elevated plateau, 150 miles north by west of Patna. It becomes conspicuous at a distance by numerous glittering temples and towers, is surrounded by a wall, and entered by a massive gateway, and consists of tolerably spacious, paved, and clean streets, lined with well-built houses, which are generally adorned with much wood carving, and have singular projecting balconies with open fronts, used for shops. The most striking part of the town is the great square containing the durbar or royal palace, an immense irregular pile, and several Chinese pagodas, so painted and gilded as to present confused masses of green, gold-leaf, and vermilion. The bustle in the streets and general activity seem to indicate that a considerable business is carried on. Population about 20,000.

KHEDIVE (*Khidîv*), a Persian word signifying *lord*, the peculiar title of the Pasha of Egypt, granted him by a firman from the sultan in 1866. In Persia it was at different eras adopted by provincial governors who were independent of the shah. The title, which had fallen into disuse, both among Persian and Turkish governors, was revived in order to give additional honour to Ismail Pasha, his previous title being only *Vali* or viceroy, whereas that of *Khidîv-el-Misr* is equivalent to 'King of Egypt.' The idea of independence was indeed strictly attached to it both in Persian and Turkish history, as the khedives recognized in the sultans and the shahs only a religious supremacy, and treated with them otherwise on the terms of an equal sovereignty.

KHERSON, or CHERSON, a maritime government of Russia, bounded north by Poltava and Kiev, north-west Podolsk, west Bessarabia, south Taurida and the Black Sea, and east Ekaterinoslav; lat. 46° 10′ to 49° N.; lon. 29° 20′ to 34° 10′ E.; area, 27,480 square miles. Almost the whole surface is one uninterrupted steppe, destitute of trees, but covered with long grass. Between the Bug and the Dnieper, and along the shores of the Black Sea, a dry, barren sand prevails. In many parts the soil is strongly impregnated with saltpetre. The chief rivers of the government are the Dnieper, which waters both its north and its south frontiers; the Dniester, which separates it from Bessarabia; and the Bug, which traverses it a little to the west of its centre. Among the hills of the north good timber grows, and is extensively used by the navy of the Black Sea. Agriculture is in a defective state, but considerable attention is paid to gardening, and cherries, melons, and all kinds of vegetables are plentifully raised. Pasture being both good and extensive, the rearing of

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cattle may be regarded as the staple employment. The easy communication by the Black Sea enables Kherson to carry on a good transit trade, particularly by its port of Odessa; but its own exports are only wool, tobacco, tallow, butter, cheese, caviare, and cattle. The inhabitants are chiefly of Russian descent, including Cossacks, but there is a considerable mixture of other races, as Germans, Moldavians, Wallachians, Tartars, Armenians, Greeks, Jews, &c. Pop. 1,765,702.

KHERSON, or CHERSON, capital of the above government, on the right bank of the Dnieper, about 15 miles above its estuary. It is a place of great extent, and regularly built; but is in a very dilapidated state, and has lost almost all its former importance in consequence of the rise of Odessa. It is divided into four parts—the citadel, the admiralty, the Greek, and the military suburbs. The port, owing to neglect, has become difficult of access, and its trade, with exception of that in timber, which is still extensive, is chiefly transit to Odessa. The chief branches of trade are rope-making, tallow-melting, and the washing and cleaning of wool. One of the latter establishments employs 600 persons. Howard, the philanthropist, died of fever here (Jan. 20, 1790). Over his grave, about 3 miles north of the town, is an obelisk, erected by the Emperor Alexander. Kherson was founded in 1778 by Prince Potemkin. Pop. (1880), 128,079.

KHIVA, or CHIVA, an independent or semi-independent khanate of Central Asia, forming part of Turkestan. It formerly occupied a large extent of surface on both sides of the Amu-Daria or Oxus, but since the cession to Russia, in 1873, of its territory on the east of the Amu, is now confined to the west side of this river. It is of a triangular shape, each of its three sides—of which the Amu forms one—being about 300 miles in length. One of its angles rests on the Sea of Aral. A great part of the surface consists of deserts, thinly inhabited or uninhabitable; but along the Amu the land is of a very different character, consisting of rich alluvial loam of the greatest natural fertility. Owing to the great dryness of the atmosphere, however, it soon becomes so stiff and hard that it cannot be penetrated by any ordinary implement. For this the obvious remedy is irrigation; and accordingly, from the earliest period, a mode of culture resembling that of Egypt has been practised. Large canals from the river, with numerous minor branches, intersect every part of the surface, supplying moisture where it is wanted, or removing it where it is in excess, and securing the most luxuriant crops of wheat, maize, rice, barley, and legumes. Cotton and madder are also generally cultivated. The vine thrives well, but requires to be defended against the winter cold by a covering of straw and earth: all the ordinary fruits, including apples, plums, cherries, apricots, figs, and pomegranates, are common; melons are so abundant as to constitute the principal summer food of the poorer classes. The ground is seldom occupied as pasture, and very little attention is paid to the rearing of cattle. The climate is remarkable for the brightness of its sky, which, with exception of January and December, when mists prevail, is generally without a cloud. The greatest cold is in December, when the Amu and the Sea of Aral are usually covered with a thin coating of ice. Night frosts are frequent in March, and often extend into April; but towards the end of the latter month vegetation becomes very rapid, and the heat increases so much as to become almost insupportable in June and July. In August the heat gradually declines, and in October night frosts begin again to occur. Manufactures are very unimportant. The only articles of any consequence are earthenware and bricks; a glazed description of the latter, remarkable for beauty of colour and fineness, is in great demand for covering the interior of mosques; some cotton and mixed goods are woven, but they are said to be among the worst which come from the East. Trade is far less extensive than might be expected from the favourable position of the khanate. It is almost confined to the immediate wants of its inhabitants, and those of the surrounding nomades. It is carried on chiefly with Russia. The principal exports are raw and spun cotton, in return for which are received various articles of European manufacture, as metals and ironware, woollen, cotton, and silk goods, &c. From Bokhara also are obtained cotton and silk goods, green tea, raw tobacco, Chinese porcelain, &c. These are sometimes paid for in money, but more frequently in Russian wares. The government of Khiva is an unmitigated despotism. The greater part of the inhabitants are Tajiks and Uzbeks, in nearly equal numbers. After these are Persians, Karakalpaks, Jamshidis, and Turcomans. The total population is under 300,000. The designs of Russia on Khiva long caused disquietude in Britain, which has always been jealous of Russian advances in Asia, mainly from a dread of interference with her Indian Empire. Accordingly Count Schouvaloff was despatched to England in January, 1873, to give explanations respecting an intended expedition to Khiva. Its object was represented as simply the suppression of brigandage, the recovery of a few Russian prisoners, and to teach the khan to desist from acts of violence in the future. The emperor, it was said, had given positive instructions that Khiva should not be taken possession of. In spite of these protestations, however, Khiva was taken possession of on the 10th of June; and later in the year, though the nominal independence of the khan was stipulated for, it was decided to annex to the Russian dominions the Khivan territory on the right bank of the Amu. The khan also renounced all right of making wars or treaties without Russian sanction.

KHIVA, CHIVA, or KHIWA, capital of the above khanate, on an alluvial flat at the junction of the Khan's and the Hezarasp Canals, 50 miles west of the left bank of the Amu. It is inclosed by a dry ditch and an earthen wall about 20 feet in height and thickness, and is entered by twelve gates, the masonry of which is of brick. The whole space thus inclosed forms an irregular circuit of about 4 miles. A considerable part of it is occupied by alleys, gardens, and cultivated fields; and within it, near its centre, is a rectangular space 640 yards long by 400 yards broad, inclosed by another earthen wall about 25 feet high by 30 feet thick, entered by three gates, and containing the principal government and other buildings. Among the principal buildings are two palaces of the khan, differing little from the other houses, except in being surrounded by higher walls, and having a wider door; seventeen mosques, generally small and unsightly; over twenty schools, several castles, belonging to the principal officers of the state; a merchant-house, caravansary, and bazaar. The inhabitants are mostly Tajiks, holding a considerable number of Persian slaves. Pop. about 12,000.

KHOJEND, a town of Central Asia, now in Russian Turkestan, but formerly in the Khanate of Khokand, on the left bank of the Syr Daria, near the confluence of the Khojend, 90 miles west of Khokand. It stands on elevated ground, and is surrounded by a decayed wall and ditches. Coarse cotton goods are manufactured here, and a considerable trade carried on in these and Russian merchandise. It is the station at which toll is paid for all merchandise entering the khanate from Bokhara. Pop. estimated at 25,000.

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KHOKAND, or KOKAND, formerly an independent khanate of Central Asia, now forming the province of Ferghâna in Russian Turkestan. Its present area is 29,650 square miles, but it was formerly much more extensive. The surface is generally mountainous. It is traversed from east to west by the Syr Daria, which receives all its drainage. The climate is remarkable for its excessive summer heat, which in May becomes almost insupportable. The winter cold is considerable, but little rain falls. The greater part of the khanate is more pastoral than agricultural, the cattle constituting the chief source of wealth; but heavy crops of grain are raised; and fruit of a great variety of sorts, and of exquisite quality, is very abundant. The manufactures consist chiefly of silk and cotton goods; and trade to a considerable extent is carried on, by means of caravans, with the Russian towns of Semipalatinsk and Petropavlovsk, and with Eastern Turkestan, Bokhara, and Badakshan. This khanate was taken possession of by Russia in 1876. The government, though despotic, was milder than that of the neighbouring khanates. Principal town, Khokand. Pop. about 800,000.

KHOKAND, capital of the above province, on both sides of the Syr. It stands open, and has no fortification, except a wall which surrounds the palace of the khan. The principal buildings are the palace already mentioned; fifty mosques, two of which are of brick and have a handsome appearance; three bazaars, situated near the centre of the town, and built of stone. The manufactures are chiefly silk and cotton tissues. The trade in cattle and silk is considerable; and the weekly markets are well supplied and frequented. Both within the town and in its vicinity numerous ancient monuments are said to exist; and the environs are covered with luxuriant gardens. Pop. about 50,000.

KHORASAN, an extensive province, occupying the whole of the north-east of Persia, and bounded on the north by Turkestan, on the west by Irak-Ajemi, on the south by Farsistan and Kerman, and on the east by Afghanistan. The surface, much diversified by mountains and plains, is to a great extent uninhabitable, consisting of arid, salt, and sandy deserts, where the general desolation is only occasionally relieved by oases. The most fertile districts are the north-west and north-east. The valley of Mushed in the latter direction is particularly celebrated. The most valuable mineral is the turquoise, which has been worked from time immemorial in the mines of Nishapur. Rock-salt is also worked extensively in the same vicinity. In many parts cotton, hemp, and tobacco grow freely, and aromatic plants and drugs are so numerous as to furnish the materials of a considerable trade. The principal manufactures are silk and woollen stuffs, carpets, muskets, and sword-blades. About two-thirds of the inhabitants are Persians proper: the remainder are Turcomans, Kurds, and other tribes, who lead a nomadic life and indulge in predatory habits. Pop. estimated at 2,000,000.

KHOSRU I. AND II. See CHOSROES I. AND II.

KHUZISTAN, a province of Persia, bounded on the north by Laristan, on the east by Farsistan, on the south by the Persian Gulf, and on the west by Asiatic Turkey; greatest length, north-west to south-east, about 290 miles; greatest breadth, about 140 miles. The south along the gulf consists of a flat arid desert; inland extensive plains occur, some of them uninhabitable wastes, others fertile and well fitted for cultivation. Of this last description is the Plain of Behbehan. Among the mountains in the north are many beautiful and fertile valleys. The principal rivers are the Euphrates and Tigris, which form two-thirds of the western boundary. The inhabitants are chiefly wandering Arabs. Their number is not known.

KHYBER MOUNTAINS AND PASS, in the north-east corner of Afghanistan, connect the most southern and lowest range of the Hindu Kush with the Suffeid Koh, Salt Range, and Suliman Mountains. The breadth of the Khyber range is about 20 miles, and its height above sea-level not more than 5100 feet. It is intersected by four different passes, of which the only one practicable for cannon is peculiarly called the Khyber Pass. Its height above the sea is 3373 feet, and above the Peshawer 2300 feet. It is about 50 miles long, and forms the northern key to Afghanistan from Hindustan. It is inclosed on each side by precipices usually 600 or 700, and sometimes 1000 or 1200 feet high. It was the scene of obstinate conflicts during the British war in Afghanistan.

KHYERPUR, or KHYRPUR, a town of Sindh, capital of the district of same name, 150 miles north of Haidarabad. It consists chiefly of a large assemblage of mud hovels, but is the chief residence of the Ameers of North Sindh, and has a gaudy mosque and several bazaars. The only manufactures are coarse cottons, plain and dyed. Pop. estimated at 15,000.

KIACHTA, a town of Siberia, in the province of Transbaikalia, on the river Kiachta, which forms the boundary between China and Russia, situated in a barren country, destitute of water and wood. Kiachta and the Chinese town of Maimatchin, situated opposite, on the other bank of the river, used to be the medium of the Russian overland trade with China, as settled by the Treaty of 1727. The duty on the trade yielded an annual income of £1,000,000 to Russia. The whole amount of imports and exports was estimated at about £4,300,000 annually. But now that trade is open along all the Russian-Chinese frontier, and tea and other Chinese products are brought by sea to the Baltic ports, the Kiachta trade has greatly fallen off. Tea is still the great article of import from China. Pop. 4286.

KIBITKA (from a root signifying *tent, vault*), the name given to a carriage without springs used in Russia, and distinguished from the *telega*, which is also much used there, by having on its hinder part a kind of roof of matting, which affords some protection from the weather, while the telega is simply an open deal waggon. Even the highest personages in Russia make their ordinary journeys in one or other of these light carriages, which, when yoked with three horses, take the name of *troika*. The kibitka is often used by the Tartars as a movable habitation.

KIDD, WILLIAM, a celebrated pirate, generally known as Captain Kidd, was born about the middle of the seventeenth century, and was originally a shipmaster of New York, where he was noted for his daring and successful seamanship. In 1696 he received a commission from William III. to take command of an armed vessel for the suppression of pirates, and accordingly, in April of that year, sailed from Plymouth as captain of the ship *Adventure Galley*, of thirty guns. He crossed over to America, where he collected a considerable number of recruits, fully 150 men, and then sailed for the East Indies and the east coast of Africa. On his way thither he turned pirate, and having found his crew ready to join him, committed extensive depredations in the Indian Ocean, and returned with his ill-gotten gains to New York in 1698. The report of his piracies, however, had occasioned great scandal, and he was forthwith arrested and sent to England for trial. It was found difficult to prove the charge of piracy, and he was accordingly arraigned for killing one of his

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crew with a bucket during a quarrel, and after a trial in which the rules and forms of justice were greatly disregarded, was sentenced and hanged at Execution Dock. Captain Kidd's exploits form the subject of a ballad commencing—'My name is Captain Kidd, as I sailed, as I sailed.' The belief of his having buried an immense treasure on the shores of Long Island Sound, or the banks of the Hudson River, has continued from his own time to the present day, and searches are still occasionally made in these localities in the hope of discovering his wealth. This popular notion forms the subject of one of Edgar Allan Poe's tales.

KIDDERMINSTER, a parliamentary and municipal borough and market town of England, in the county and 13 miles north from Worcester, on the banks of the Stour, about 3 miles above its confluence with the Severn. The principal ecclesiastical buildings are St. Mary's church, a fine ancient structure with a small tower; St. George's, of later date, with an ornamental tower; two other churches in the Norman style, and several Dissenting and Roman Catholic chapels. It has a fine town-hall and corporation buildings (opened January, 1877), a spacious infirmary, a government school of design, free library, several churches, a free grammar and other schools, baths, alms-houses, two markets, an extensive cemetery, &c. Kidderminster is famed for the manufacture of carpets, rugs, and tapestry, which forms the staple industry of the place. Various other woollen fabrics, however, are also made; and in the town and neighbourhood are several extensive worsted spinning-mills and dye-works. There are also iron-foundries, tin-plate works, flour-mills, a haircloth manufactory, paper-mill, &c.; and tanning, currying, and brewing are carried on. It lies on the Staffordshire and Worcestershire Canal, and has a station on a branch of the Great Western Railway. Kidderminster returns one member to the House of Commons. Pop. (1871), 20,814; in 1881, 24,270.

KIDNAPPING is the forcible and wrongful seizing upon any person with intent to carry him away out of the country or jurisdiction within which he is seized, or to confine him, or sell him into slavery. This is a heinous offence, and was punished by fine, imprisonment, and pillory by the common law. The statute of 11 and 12 William III. cap. vii. provides a punishment by imprisonment for three months in case the captain of a merchant vessel shall, while abroad, force any person on shore, and wilfully leave him behind, or who shall refuse to bring home any whom he may have carried out, when the person shall be able and desirous to return. 24 and 25 Vict. cap. c. s. 56, makes kidnapping any child under fourteen years felony, and exposes the perpetrator to be kept in penal servitude for any term not exceeding seven years, and not less than three, or to be imprisoned for any term not exceeding two years, with or without hard labour, provided the person be not the mother or one who has claimed to be the father of an illegitimate child.

KIDNEY BEANS. See FRENCH BEANS.

KIDNEYS, two of the abdominal viscera, existing in the form of two glands, the function of which is to secrete the urine from the blood. One of the kidneys lies on the right side of the abdominal cavity, the other occupying the left side. Hence they are spoken of as the right and left kidneys. They occupy the lumbar region or regions of the loins, and are situated nearly opposite the two lower back or dorsal vertebræ and the two upper lumbar vertebræ. The right kidney lies at a slightly lower level than the left. They lie imbedded among fatty cellular tissue (= suet), upon the two muscles known as the *quadratus lumborum* and the *psoas*. The right kidney is in contact, at its upper portion, with the liver, and laterally with the duodenum or first portion of the small intestines, and with the ascending portion of the colon. The left kidney touches the spleen, the pancreas or sweetbread, and the descending portion of the colon. The kidneys are external to the peritoneum or lining membrane of the abdominal cavity, lying behind this membrane. The *supra-renal capsules* are two small bodies situated at the upper portion of the kidney. They are somewhat almond-shaped, have no efferent duct or outlet, and their precise function is unknown; although the disease known as *Addison's disease*, which is manifested by a peculiar bronzing of the skin, is believed to be associated with, and by some pathologists to take origin from, disease of these capsules. The bean-like shape and form of the kidney is so well known that the phrase 'kidney-shaped' has passed into common use in ordinary life. The arched or convex side of each kidney is turned outwards, the concave or depressed side being turned inwards and towards the spine. The notch or depression on the inner side is termed the *hilum*, and from this notch the excretory duct or *ureter* proceeds, whilst the blood-vessels of the kidney (*renal artery* and *vein*) enter and leave the gland at this point. Externally the kidneys are of a reddish-brown colour. The weight of each male kidney is about 5 ozs., those of the female weigh each somewhat less; whilst in both sexes the right kidney is the smaller, and weighs less than the left. Each gland is covered by a thin investing sheath or capsule of fibrous tissue, which has no extension into the substance of the organ. The general structure of the kidney is best seen by making a longitudinal section through the organ, when the division of its internal substance into an outer deeper-coloured or *cortical* portion, and an inner lighter-coloured or *medullary* portion, will be seen. The cortical substance is better supplied with blood-vessels than the medullary portion, and in this part of the gland the essential or tubular structure may be traced. The cortical substance consists of twisted tubes (*tubuli uriniferi*), and of the so-called *Malpighian corpuscles*. The term Malpighian corpuscles was derived from the name of Malpighi, an Italian anatomist of the seventeenth century. These Malpighian corpuscles are each about $\frac{1}{120}$th of an inch in diameter, and each consists of a *capsule* inclosing a looped network of blood-vessels. At the summit of each capsule a minute twig of the renal artery enters, and forms the looped network or tuft of blood-vessels which is known as the *glomerulus*. The blood of this minute artery is returned by a small vein, which leaves the capsule close by the entrance-point of the little artery. This efferent vein at first unites to form a plexus or network of vessels surrounding the uriniferous tubes, and ultimately through the plexus opens into the renal vein or one of its main branches. Continued from the base of each Malpighian corpuscle or body, we find a uriniferous tubule. Each Malpighian body is in fact generally regarded as the mere dilatation of the tubule, which latter is lined by epithelial cells, although it is doubtful if this cell-lining is continued into the Malpighian body or invests the glomerulus. If present in the capsule, the cell-lining must be exceedingly delicate. Turning now to consider the central, inner, or medullary portion of the kidney, we find the hilus or notch of the gland to expand in the longitudinal section, into a funnel-shaped cavity, known as the *pelvis* of the kidney, which appears to be formed by the wide expansion of the ureter before it leaves the organ. Into the pelvis of the kidney a number of conical bodies project, these latter being known as the *pyramids;* and hence the medullary part of the kidney is occasionally termed the *pyramidal* portion. These pyramids are simply collections or bundles of uriniferous

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tubes, continued from those we have already seen to take origin in the Malpighian bodies of the outer portion of the gland; and on the summits, *apices*, or *papillæ*, of the pyramids, the numerous openings of the tubes may be seen even by the aid of an ordinary lens. The pelvis of the kidney, already described as formed by the dilatation of the upper end of the ureter, divides at first into two primary or main channels, and these primary channels branch out into eight or twelve cup-like portions known as *calyces*. Into these calyces or subdivisions of the pelvis the pyramids of Malpighi, already described, open. The uriniferous tubules, when in the pyramids, are arranged in straight, parallel rows, but as they ascend and pass outwards from the medullary substance to the cortical portion of the kidney they radiate and diverge; and in the cortical substance the tubes finally become much interlaced and convoluted, entering into the relations with the blood-vessels and dilating to form the Malpighian bodies, already noticed. The uriniferous tubes average $\frac{1}{175}$th of an inch in diameter, their largest diameter being in their terminal portions, just before they open in the pyramids. The *looped tubes of Henle* are a series of smaller tubules which intervene between the ordinary straight tubules of the medullary and the convoluted tubes of the cortical portion. The blood-vessels of the kidney consist of the *renal artery*, derived from the aorta, and *renal vein*. The branches or subdivisions of the artery enter the gland at the hilus, and pass into the substance of the gland between the papillæ. Finally the branches of the renal artery reach the cortical portion, and therein subdivide into the minute vessels, which form the *glomeruli* of the Malpighian bodies. The renal veins leave the kidney also at the hilus, and pour their contents into the great main vein of the lower parts of the body (*vena cava inferior*). The nervous supply of the kidney is derived from the renal plexus, the nerves of which arise in turn from the smaller splanchnic nerves, and from the solar plexus or large sympathetic mass of the abdomen. Having thus gained an idea of the structure of the kidney, we may next look at its *functions*. These are, in chief, the separation from the blood of the constituents of the *urine*. This function is accomplished by the corpuscles of the kidney, and by the uriniferous tubules, the substances separated by the kidney from the blood being chiefly water, urea, and a little carbonic acid. The urea, uric acid, &c., may simply be excreted from the blood without necessitating any chemical action on the part of the gland; but the other chemical salts (for example, sulphates and phosphates) which do not exist in the blood in that form, require first to be secreted or elaborated by the kidney, and thereafter excreted. In this view the gland may be considered as involving both secretion and excretion, in its work. The Malpighian corpuscles strain off, as it were, the watery parts of the blood, whilst the tubules remove the more solid parts and matters contained in the urine. The passage of the blood through the kidney is rendered free by the patent and relaxed condition of the walls of the minute blood-vessels; and from the blood brought to and passing through the gland the characteristic secretion of the kidneys is elaborated. The venous blood which leaves the kidneys by the renal veins is the purest blood in the body, and contains even less foreign or waste matters than the pure arterial blood which the left side of the heart sends out to the body. Gradually, the secreted urine passes through the tubules from the cortical to the medullary portion, and through the papillæ of the pyramids is excreted into the pelvis of the kidney. Thence it passes into the ureters, which in turn open into the bladder behind its orifice or neck. The secretion of urine is very rapid in health, the fluid falling into the bladder in two or three drops every minute when fasting, but the flow is more rapid after a meal or exercise. Certain substances taken into the stomach may be very quickly absorbed, and may be detected in the urine in a remarkably short space of time. The process of absorption and secretion of such substances is always slower during the active operation of the digestive process.

Inflammation of the kidneys is known as *nephritis;* and various forms of grave disease are connected with structural or functional disorders of the organ and of its secretions. Occasionally concretions of mineral substances accumulate in the kidney, and cause, in their passage from the gland and through the ureter, most excruciating pain.

The kidneys, whilst doubtfully present in invertebrates, yet appear to be functionally represented in many of the lower forms in which structures apparently excretory in nature and purpose are found. In all vertebrates, with the single exception of the lancelet, kidneys are present. In all vertebrates also, save in the lancelet, the kidneys of the embryo are represented by the *primordial kidneys* or *Wolffian bodies*. These bodies are tubular in structure like the kidneys; and in fishes and amphibians the Wolffian bodies become the kidneys of mature life; whilst in birds, reptiles, and mammals, the primordial kidneys are replaced by the true and subsequently developed glands, the Wolffian bodies becoming absorbed as the true kidneys are developed. The kidneys are formed behind the Wolffian bodies, and the ducts of these bodies and of the true kidneys exist independently of each other so long as the primordial kidneys are functionally active. The true kidneys of man before birth exhibit a lobulated appearance; but as development advances, the lobules become obliterated, and the surface of the organ is thus made smooth. See also URINE and WOLFFIAN BODIES.

KIEF. See KIEV.

KIEL, a town of Prussia, in Holstein, beautifully situated on a deep bay of the Baltic, which presents all the appearance of a lake, and has finely-wooded banks, 54 miles north by east from Hamburg, with which it is connected by railway. It was formerly the place of meeting for the Schleswig and Holstein States, and the seat of a superior appeal court for the duchies. It possesses a university, founded in 1665, with an attendance of about 300 students; a library of 140,000 volumes, a museum of natural history, an anatomical theatre, an observatory, and a botanic garden. At the east end of the town is a castle, rebuilt since 1838, and the residence of the Duke of Holstein-Glücksburg. Kiel possesses also an orphan hospital and infirmary; and is admirably situated for trade, the whole bay on which it stands forming a safe roadstead, and the town being provided with spacious quays. The Holstein Canal joins the Baltic 2 miles north of the town. More especially since the completion of the railway connecting it with Hamburg, it has entered into formidable competition with Lübeck, and as a fortified naval port of Germany, and the station of the greater part of the imperial fleet, is rapidly rising in importance. Besides shipping, Kiel has sugar, soap, machine, and several woollen factories, iron-foundries, oil-mills, tan-works, and tobacco and vinegar works, ship-building yards, &c. Pop. (1880), 43,594.

KIEN-LUNG, Emperor of China, distinguished by his love of literature, was born in 1710, and succeeded his father, Yung-Ching, in 1735. He favoured the Christian religion in private, but in 1753 interdicted its exercise by a formal order; and he had previously even persecuted those who openly professed it. The missionaries were, in consequence,

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obliged to proceed with great caution, although several of them were in the emperor's service, and treated with great respect as men of science and learning. On the suppression of the Jesuits, in 1774, China was less visited by scientific persons than formerly, which induced Kien-Lung to send to Canton and invite artists and learned men of all the European nations, and particularly astronomers. He carried on several wars, and in 1775 reduced Miaotse. This sovereign possessed, on his own part, a taste for poetry and natural history. Resolving to immortalize the remembrance of his victories by the graver, he engaged French artists to copy some Chinese paintings in which they were represented; but Louis XV. had them engraved for him at his own expense. The larger Chinese collection on agriculture contains several poems of this monarch on rural occupations and incidents; and he established a library of 600,000 volumes, containing copies of all the most interesting works in China. Into this collection he admitted three books written by the Jesuits on the Christian religion. A description of the Chinese Empire which appeared in Busching's Magazine was also compiled by his order. In 1793 he received Lord Macartney's English embassy. Two years later he abdicated in favour of his son, and died at Pekin in 1799, after a reign of more than sixty years.

KIEV, KIEW, KIEF, or KIOW, a government of Russia, bounded N. by Minsk, W. by Volhynia and Podolsk, S. by Podolsk and Kherson, E. by Tchernigov and Poltava, from which last two governments it is separated by the Dnieper. Length, 210 miles; average breadth, about 170 miles; area, 20,000 square miles. The surface is in general flat and monotonous, but undulating; intersected occasionally by acclivities and hills of moderate elevation along the course of the Dnieper and other streams. The Dnieper is the only navigable stream. There are no lakes of any extent. The climate is remarkably mild and dry. The rivers freeze in December, and are again open in February. In summer the heat is so great, and the quantity of rain so small, that the channels of many streams become dry. Large crops of all kinds of grain are raised, and much attention is paid both to the rearing of cattle and the dairy. There is a large export of grain, cattle, honey, wax, and tobacco. The forests are not very extensive, but the timber is of excellent quality. Pop. 2,530,204.

KIEV, KIEW, KIEF, or KIOW, a town of Russia, capital of the above government, 650 miles south from St. Petersburg. It stands picturesquely on the right bank of the Dnieper, here crossed by a magnificent suspension-bridge, and properly consists of three towns, each of which has its separate fortifications and suburbs. The first is Petchersk, or the New Fort, which crowns a rugged steep to the south, and is a place of great strength. Besides the barracks, magazines, and official residences connected with the garrison, it contains several churches, of which the most remarkable is that of St. Nicolas Thaumaturgus, built of wood. In the same neighbourhood stands the famous monastery of Petscherskoi, surrounded by a wall 1100 yards long. The second town is Kiev proper, which occupies a height towards the north lower than that on which Petchersk stands, and less regularly fortified. It contains the venerable cathedral of St. Sophia, founded in 1037 by the Grand-duke Jaroslav Vladimirovitch to commemorate a victory. Most of the houses in Kiev proper belong to this church and the convent of St. Michael. The third town, called Podol, occupies the lower ground, and is inhabited chiefly by the middle and lower class. Kiev has streets generally broad, and it contains an archbishop's palace, prison, town and military hospital; a university, founded in 1833, attended by about 1500 students; an academy, a gymnasium, and a printing-press, for the Scriptures and ritual books of the Greek Church. Its trade has become extensive, particularly since Odessa was built; and it has a large annual fair in January, which lasts for three weeks. Kiev possesses considerable historical interest as the spot on which Christianity was first planted among the barbarous hordes of the steppes of Russia, and as having been for a long time the recognized capital of all Russia. Pop. 127,251.

KILBRICKENITE, a variety of geocronite (which see), from Kilbricken, Clare county, Ireland. It is a sulphide of antimony and lead, has a bluish-gray colour, and occurs in amorphous masses. Its specific gravity is a little lower than geocronite. It dissolves slowly in hot hydrochloric acid, with evolution of sulphuretted hydrogen, and gives the ordinary reactions for lead and antimony.

KILDA, ST., a small and lonely island in the Atlantic Ocean, belonging to Scotland, 112 miles west from the Butt or northern extremity of the island of Lewis. It is about 3 miles long by 2 broad, of an irregular form, having a wide and deep indentation at its north-eastern end called East or Village Bay, and a smaller at its south-western extremity called West Bay. The whole appearance of this rocky isle is sufficiently wild and impressive; a great portion of its sea-front being composed of perpendicular precipices, which in some parts rise to a height of many hundred feet. The surface rises in the peak called Conochan to the height of 1380 feet. In the interior a verdant turf covers most of the island, giving way, on the higher elevations, to moss. The soil is good, and an improved cultivation has of late years found its way even to this remote and solitary isle. The arable land is chiefly laid out in small rigs of barley, of which, in ordinary years, a sufficient quantity is raised for the consumption of the inhabitants, who, however, amount only to about 80 persons. At the head of East Bay is the only hamlet on the island, on an elevation sloping gently towards the sea, the whole encompassed by a stone fence. The number of dwelling-houses in the hamlet amounts to about twenty; they are of rather curious construction, resembling at a little distance a Hottentot kraal, without its regularity, but having a somewhat similar kind of semicircular roof. The inhabitants have all Highland names, and speak the Gaelic language. They are of low stature, but stout, active, and intelligent, simple-minded, and kind-hearted. Their principal occupation is catching wild-fowl, in the taking of which the most appalling feats of daring are performed; the fowler being suspended over perpendicular cliffs of many hundred feet in height by a single rope, held by a single person on the margin of the precipice. They also catch and salt numbers of fish. There were, a few years since, about fifty cows on the island, of small size, but yielding a delicious milk, and about 2000 sheep. The people pay their rent chiefly by means of feathers; they also export some wool and fish. There is a clergyman on the island, and a small place of worship adjoining the manse.

KILDARE, an inland county of Ireland, in the province of Leinster; bounded N. by Meath, E. by Dublin and Wicklow, S. by Carlow, W. by King's, Queen's, and Westmeath counties; length, 40 miles; breadth, 27 miles; area, 417,402 acres, of which, in 1851, 113,868 were under crops. The surface is flat, or gently undulating, swelling here and there into low hills covered with delightful verdure. The soil is mostly a rich loam, resting on drift gravel, limestone, or clay-slate. Nearly in the centre of the county is the well known Curragh of Kildare, a vast,

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unbroken plain, consisting of 4858 acres, the property of the crown—the adjacent proprietors having the privilege, under certain restrictions, of grazing sheep on it. There are here a government camp, and at Newbridge large cavalry barracks. Oats, potatoes, barley, and turnips are the principal crops. Oxen are in general use both for draught and the plough. The manufacture of woollens is carried on to some extent, and brickmaking is a considerable industry near Athy, but the chief occupations are agricultural. Principal rivers—Barrow, Liffey, and Boyne. Chief towns—Naas, Athy, and Newbridge. Kildare is divided into fourteen baronies and 116 parishes, and returns two members to Parliament, both for the county. Pop. in 1841, 114,488; in 1881, 75,804. Between 1st May, 1851, and 31st December, 1881, 25,416 persons emigrated.

KILDARE, a market town of Ireland, in the county of Kildare, on an eminence 30 miles S.W. from Dublin, on the Great South-Western Railway. It has an air of respectability and importance. The cathedral, which was for a long time in a ruinous condition, has now been restored, and contains the burial vault of the earls of Kildare; a Roman Catholic chapel, a Carmelite friary, and a convent, with a chapel attached to each; National and other schools; an infirmary and a dispensary. Near it is the extensive common known as the 'Curragh of Kildare,' on which a permanent military camp has been formed. Kildare gives the inferior titles of earl and marquis to the Duke of Leinster. Pop. (1881), 1174.

KILIA, a town of Turkey in Europe, in Moldavia, on an arm of the Danube of the same name, 21 miles N.E. from Ismail. It is a place of strength, and has a valuable fishery (at which a great deal of caviare is prepared), and a trade in cattle, hides, wax, and honey. It is one of the places ceded by Russia in 1856. Pop. 6400.

KILIMA-NDJARO (the Great Mountain), supposed to be one of the mountains to which the name 'Mountains of the Moon' was at one time vaguely applied, in lat. 3° 40′ S.; lon. 36° E., is 20,000 feet above the sea-level, the highest mountain in Africa, and always snow-clad. It is situated on the western border of Zanzibar. It was discovered in 1847, and has two summits 10 or 12 miles apart.

KILKEE, a bathing place on the west coast of Ireland, county Clare, situated on a creek of the Atlantic. It is semicircular in form, with a fine beach of sand in front, and has a number of good villas and lodging-houses, and two hotels. There are chalybeate springs near by, and an ancient Danish fort. Pop. (1881), 1652.

KILKENNY, an inland county of Ireland, in the province of Leinster; bounded N. by Queen's County, E. by Carlow and Wexford, S. by Waterford, and W. by Tipperary; greatest length, 46 miles; breadth, 24 miles; area, 796 sq. miles, or 509,732 acres, of which, in 1883, 146,290 were under crops. The surface is level, with some mountains, chiefly situated between the Nore and Barrow, consisting of a nucleus of clay-slate surrounded by sandstone. The subsoil is chiefly limestone, with clay-slate and sandstone in the higher parts. The general colour of the limestone is a bluish gray, which near the town of Kilkenny passes into a fine black marble, susceptible of a high polish, and containing a great variety of shelly impressions. These beds are extensively quarried, and the blocks dressed on the spot. The coal formations are nearly co-extensive with the hilly districts, but the coal is anthracite and chiefly used locally. The principal rivers are the Barrow, Nore, and Suir. The soil is for the most part light and dry, some valleys being extremely fertile. The chief crops are wheat, oats, barley, bere, rye, pease, beans, potatoes, turnips, mangold-wurzel, carrots, and parsnips; some cabbage, and a little flax. Some of the best wheat and meadow lands in Ireland are situated in the level tract along the Suir. Dairy husbandry also is extensively practised. Farms are generally small, there being comparatively few above 30 acres. The county contains ten baronies and 143 parishes, and returns two members to Parliament; and Kilkenny city, the capital, returns one. Pop. in 1841, 202,420; in 1881, 99,531. The number of emigrants from the county between 1st April, 1861, and 31st March, 1881, was 21,471, the number in the year last mentioned being 1181.

KILKENNY, a city, parliamentary borough, and county of itself, Ireland, locally in Kilkenny county, of which it is the capital, 73 miles S.W. from Dublin, delightfully situated on both sides of the Nore, here crossed by two handsome stone bridges. The city contains several interesting ancient edifices, which tend to give it a venerable and picturesque appearance. These structures consist of the cathedral, the castle, now modernized, and several abbeys. The places of worship comprise the cathedral, already mentioned; two Episcopal and six Roman Catholic churches, and meeting-houses for Presbyterians and Methodists. The other modern public buildings are the city and county jail, a court-house, infirmary, fever hospital, union poor-house, house of correction, &c. The schools include Kilkenny College, a grammar-school, in which Swift, Congreve, Farquhar, Bishop Berkeley, and other distinguished characters, received the early part of their education; the College of St. Kyran, a Roman Catholic seminary for the education of young men intended for the priesthood, &c. Kilkenny was formerly the seat of extensive manufactures, most of which, however, have either entirely disappeared, or have greatly fallen off. The manufacture of coarse woollens has recently begun to revive; and some little business is done in tanning, brewing, and the working of Kilkenny black and foreign marbles into chimney-pieces, monuments, tables, and other articles. A considerable trade is done in salt, flour, ale, porter, and bacon, for which the town still maintains a high reputation. Kilkenny gives the title of earl to the family of Butler, and returns one member to Parliament. Pop. in 1881, 12,299.

KILLARNEY, a market town of Ireland, in the county of Kerry, in the midst of the most beautiful scenery, within a mile of the celebrated lakes to which it gives its name, 44½ miles W. by N. from Cork, on the Great Southern and Western Railway. The principal streets are straight and well paved, and the houses in general substantially built of stone. It has a handsome parish church, a magnificent Roman Catholic cathedral in the Gothic style, two convents, a monastery, court-house and bridewell, lunatic asylum, and several fine hotels. In summer Killarney is thronged with visitors to the lakes and the delightful scenery in the neighbourhood. Fancy articles of wood, particularly of arbutus, which attains to great perfection in the environs, are made to a considerable extent, and are in great request by tourists. Flour is also manufactured extensively. Pop. 6651.—The lakes, three in number, are all connected with each other. The lower lake is about 6 miles long by 3 miles broad; the middle, 2 miles long by 1 mile broad; the upper, 3 miles long. They receive several streams, are interspersed with numerous islands, which, as well as the sloping and lofty sides of the lakes, are richly wooded, presenting the loveliest scenery almost anywhere to be met with.

KILMARNOCK, a parliamentary and municipal burgh and market town of Scotland, in the county of Ayr. The town is 19 miles S.W. from Glasgow on the Glasgow and South-Western Railway, near

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the confluence of the Kilmarnock Water with the Irvine. The principal street is upwards of 1 mile long, and contains many handsome buildings; houses generally of freestone, obtained from quarries in the neighbourhood; the streets generally are wide and airy, and the town is well supplied with water. Near its centre, on a bridge across the Kilmarnock, is the town-house; and at the cross is a fine marble statue of Sir James Shaw, Bart., a native of the vicinity, who had been lord-mayor of London. It has one Episcopal church, four Established churches, six Free, three United Presbyterian, one of which has a fine spire; and several other Dissenting churches; numerous schools, including an academy, an elegant building; an exchange, a mechanics' institution, a philosophical institution, a public library, reading-room, a dispensary, and several benevolent societies. It has also two public parks, in one of which are a monument and statue of Burns, including a museum. Kilmarnock has long been famed for the excellence of its woollen manufactures, formerly consisting chiefly of broad and other bonnets, and striped cowls, but now of carpets, which have become the staple. There are also manufactories of machinery, tobacco, candles, hats, and hosiery, besides several extensive tanneries and railway engineering works; and a considerable business is done in the making of boots and shoes for exportation. Kilmarnock unites with Dumbarton, Port-Glasgow, Renfrew, and Rutherglen in returning one member to the House of Commons. Pop. in 1881, 24,977.

KILOGRAMMETRE, a unit employed in the measurement of mechanical work; it is the mechanical work expended in raising a body whose weight is 1 kilogramme (2·2046 lbs.) through the vertical height of 1 metre (3·2809 feet). The English engineer's unit of work is 1 foot-pound, a kilogrammetre is equal to 7·233 foot-pounds. 1 *force de cheval* ($\frac{1}{11}$ of an English horse-power) is equal to 75 kilogrammetres per second.

KILRUSH, a market town and seaport of Ireland, in the county of Clare. It is agreeably situated on the north shore of the estuary of the Shannon, 36 miles W. by S. from Limerick, is neatly built, and consists of a market-square, intersected E. to W. by a spacious, well-paved, and flagged street, with several smaller thoroughfares diverging from it. It has a commodious and handsome market-house, court-house, a neat custom-house, a bridewell, and a police barrack; Protestant, Episcopal, Roman Catholic, and Wesleyan Methodist churches; free and other schools; a dispensary, and fever hospital. The manufacture of woollen and linen cloth is carried on to some extent, and the produce of the fishery is considerable. Steamers regularly ply between this port and Limerick. The chief trade is in agricultural produce of all kinds. The town is much resorted to for sea-bathing. Pop. 3805.

KILSYTH, a town and police burgh of Scotland, in Stirlingshire, 12 miles N.E. from Glasgow, a straggling, irregularly built place. It has a parish, a Free, a United Presbyterian, and other churches; several schools, a library, and friendly society. The inhabitants generally are employed in the mining industry, the parish being abundantly stocked with coal and iron ore, in the centre of which is a remarkable basaltic hill. Population of the town in 1881, 5405.

KILWINNING, a town of Scotland, in Ayrshire. It is pleasantly situated on a gentle elevation on the right bank of the Garnock, 21 miles S.W. Glasgow, on the railway thence to Ayr. It consists principally of one street about 1 mile long, and contains a parish church and several other places of worship, schools, &c. The inhabitants are chiefly employed as hand-loom weavers, or in the mines and quarries in the neighbourhood. A large woollen factory has been recently erected. With the erection of the abbey of Kilwinning, founded, it is believed, in 1140, now a fine ruin, is associated the introduction of freemasonry into Scotland. Pop. in 1881, 3469.

KIMCHI, DAVID, one of the most famous Jewish rabbis of the middle ages, appears to have been born about the year 1190, at Narbonne, where he afterwards spent the greater part of his life. He died in 1240. He wrote commentaries on almost all the books of the Old Testament, and also rendered essential service to Hebrew literature by the composition of his Grammar, entitled Michlol (1545), or Perfection, which has often been reprinted, and his Sepher Schoraschim, or Dictionary of Hebrew Roots. Subsequent Hebrew scholars have been under great obligations to him, though they have sometimes failed to acknowledge them. His father Joseph and his brother Moses also distinguished themselves in the same walk of literature. In 1232 he was appointed arbiter between French and Spanish rabbis in the celebrated Maimonides controversy.

KIN. See DESCENT.

KINCARDINESHIRE, or THE MEARNS, a maritime county on the east coast of Scotland, having Aberdeenshire north and west, Forfar south and west, and the North Sea east; greatest length, 24 miles; breadth, 22 miles; area, 248,284 acres, of which 1280 acres are water. About half the county consists of cultivated land, wood-land, improvable moor, &c. The Grampian Mountains, by which it is traversed north-east to south-west, occupy a large portion of its surface, but their highest summit within the county is Battock, only 2555 feet above sea-level. The more elevated regions of the county are sterile; but there is a considerable proportion of comparatively low, fertile, and well-cultivated land. The geological formations of the county comprise large proportions of granite, old red sandstone, gneiss, and porphyry, with narrow parallel bands of mica and chlorite slates running north-east and south-west. On some parts of the coast the cliffs, consisting of alternate beds of fine sandstone and conglomerate, with occasional veins and masses of trap, rising to heights varying from 150 to 300 feet, are in many places inaccessible. In these rocks many curious caves and natural arches occur, one of the latter being 150 yards long. The principal rivers are the North Esk, Bervie, Carron, Cowie, and Dee, with its tributary Feuch, which receives the Dye. The arable land consists chiefly of a tract called the Howe of the Mearns. It contains about 50,000 acres of low, fertile, and well-cultivated land, with about 7000 acres of plantations. On the east the Howe is sheltered by a range of low hills, which separate it from the coast district. The latter contains about 68,000 acres, of which about 32,000 acres are in a high state of culture. The other arable district consists of the narrow glen or valley lying along the Dee. The principal crops are wheat, barley, oats, beans, pease, turnips, and potatoes. The total area under crops, bare fallow, and grass in 1882 was 120,676 acres, of which 45,230 acres were occupied by corn crops, and 22,093 by green crops. Cattle and sheep are reared to a considerable extent. There were 24,162 cattle in 1882, and 24,434 sheep. The manufactures are confined to some woollen and linen weaving. Kincardineshire contains nineteen parishes, and one royal burgh—Bervie or Inverbervie—and sends one member to parliament. Stonehaven is the county town. Pop. in 1871, 34,630; in 1881, 34,464.

KINEMATICS, a branch of mathematics which treats of the motions of bodies independently of the forces which produce these motions; it is usually treated of in the introductory parts of works on

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kinetics (popularly termed dynamics). See Thomson and Tait's Natural Philosophy.

KINETICS (popularly termed dynamics), that branch of the science of dynamics which treats of forces causing motion in bodies. See MECHANICS.

KING (Anglo-Saxon, *cyning, cynig, cyng;* German, *könig;* Danish, *konge;* Swedish, *konung, kung;* Dutch, *koning*). The person invested with supreme power in a state. The primary sense is chief or head of the race. The Sanskrit *janaka*, father, from the root *jan*, to beget, seems to be a cognate word. Down to the union of Britain and Ireland the kings of Britain bore the title of kings of Great Britain, France, and Ireland. Where the Salic law of succession does not prevail, a queen-regnant possesses all the rights of a king. For information respecting the prerogatives and limitations of the kings of Great Britain, see BRITAIN, division British Constitution.

KING-CRAB (*Limulus*). These peculiar crabs are included in the order Xiphosura (sword-tailed), of the class Crustacea. They are found on the coasts of northern and tropical America and the Antilles, and also inhabit the shores of the Asiatic continent, chiefly in the Eastern Archipelago and Japan. The Moluccas form a very well known centre of distribution of these crabs, and hence they are sometimes known as *Molucca-crabs*. The Malays eat not only their flesh but their eggs also, and the long spinous tails with which they are provided are adapted by the inhabitants of the islands in the Eastern Archipelago to form spear or lance-heads. The front portion of the body consists of a broad horse-shoe shaped, or crescentic shield, upon the convex upper surface of which, two pairs of eyes are found. The first pair represent the eyes of the larval or early stage of the creature, and are simple in nature; but the second pair of eyes are larger, form the true visual organs of the animal, and are compound, each being composed of numerous little facets, or simple eyes, aggregated to form a single and compound organ. The mouth opens on the lower and concave surface of the front shield, and a most characteristic feature of these crabs is found in the presence around the mouth of five pairs of limbs, furnished with *chelæ*, or pincer-like claws, and a single pair of *antennæ*, or feelers, which also terminate in *chelæ*. The basal or attached joints of these six pairs of limbs are provided with spinous processes, so that food seized by the terminal pincers is also masticated by the spines which more immediately surround the aperture of the mouth. Attached to the hinder margin of the front shield—which represents the united head and chest of the crab—a second shield or piece, somewhat hexagonal in shape, and representing the abdomen, is found. The front portions of this abdominal piece are inclosed within the great front shield, but the hinder sides are free, and two of these free sides bear movable spines, whilst the third or middle part gives origin to the long spinous tail, or *telson*, as it is called, which is capable of free movement in every direction. Beneath the abdominal or hinder shield the gills, or *branchiæ*, are found, borne upon five pairs of appendages which represent the abdominal feet of the crab. The first two of these abdominal feet form a protective cover for the others. The reproductive organs are also situated on the under surface of the abdominal segments, and are similarly protected by an *operculum* or plate-like structure derived from the front shield of the body. The telson, or spinous tail, merely represents one of the appendages of the abdomen greatly elongated. In the young, or larval state, the spinous tail is wanting, and the hinder feet bearing the gills are limited in number when compared with those afterwards developed in the adult. The eggs appear to be deposited in a shallow hole which the female excavates between high and low tide marks. The average length is about 2 feet from the front portion of the body to the tip of the tail, the males being generally smaller than the females. In old individuals the spines become blunted, and may even fall off or become obsolete, a tubercle being left to mark the former position of each spine. These crabs are destitute of swimming powers, and appear to move by crawling slowly over the bottom of the sea. If placed on their backs they appear, like turtle, unable to recover their natural position, a fact said to be taken advantage of by the hogs which feed upon them, in rendering their capture an easy matter. The tail is capable of being moved about, erected or depressed, but does not appear to be otherwise used as a means of offence or defence. The commonest species is the *Limulus polyphemus*, found chiefly on the North American coasts, and known by possessing seven spines on the upper part of the front shield, and three on the upper surface of the hinder shield. The upper surface of the tail, as in other species, bears numerous spines (Pl. LIV.–LV. fig. 27). The *Limulus Moluccanus*, of the Moluccas, possesses a strongly serrated tail. This latter species is largely eaten.

KINGFISHER (*Alcedo*, Linnæus). This genus of Fissirostral birds (Insessores), forming the type of the family Alcedinidæ, is distinguished by the elongated, stoutly formed, tetragonal bill, broad at the base, and terminating in a finely acute point, with its edges crenately-fimbriate. The tarsi are short, feet strong, and the toes somewhat elongated. The arrangement of the toes in this family varies greatly. The anterior or front toes—which in the majority of Insessores number three—may be two or three in number; the ordinary third front toe being in some cases directed backwards with the posterior or hind toe. The front toes are generally webbed in a slight degree. In colour the common kingfisher of this country (*Alcedo ispida*) has the upper part of the head, the sides of the neck, and the coverts of the wings green, spotted with blue. The back is dark green in colour, the lower back and rump being of a bright blue. The throat is white, and the under surface of the body a pale brown colour. The habits of the kingfisher are exceedingly characteristic. It frequents the banks of rivers, and is almost always found solitary, perched on the bough of a tree. In this position it may remain motionless for hours watching for fish. When the prey is perceived it dives into the water, secures the fish with its feet, carries it to land, where it kills the prey and swallows it entire, the scales being afterwards rejected, along with the other indigestible parts, in the form of round balls or masses. The note of the kingfisher is shrill and piercing, and when flying it frequently sends forth its cry. The nest is generally found in the banks of rivers, or in other situations near the water's edge. The kingfisher was long supposed to ensconce itself in the holes or burrows of other animals, and that in this way the nest was formed. It is certain that these birds disgorge the indigestible portions of their food in holes in the banks of streams, and upon the bones, &c., of fish thus ejected the eggs are deposited, and the female also incubates there. Whilst, therefore, the kingfisher may select a disused hole or burrow, it also in some degree prepares the nest after its own fashion, and adapts the ready-made dwelling-place to its own and peculiar taste. The American kingfisher (*Alcedo alcyon*) excavates for itself a burrow or pit in which the nest is built, and from analogy, our own species may be regarded as resembling in habits its American neighbour. The latter species, common in the United States, is of a bluish slate colour, with an iron-coloured band on the breast, whilst the head bears a crest of

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feathers. The eggs of the kingfisher are coloured delicately pink, and vary from five to six or seven in number. This bird has been greatly celebrated in ancient poetic and legendary lore. The ancients supposed that it built its nest upon the ocean, and that it possessed the power of lulling the tempests that otherwise would have destroyed its bark during the period of incubation. Hence the tranquil days near the solstice were known as 'Halcyon days.' Ovid remarks this belief in the line:—

'Incubat halcyone pendentibus æquore nidis.'

The charm by which the kingfisher was believed to lull the tempest, was supposed to be that of a sweet song:—

'Cum sonat halcyones cantu, nidosque natantes
Immota gestat, sopitis fluctibus, unda.'
—Sil. Ital.

Other superstitious ideas gave to this bird the power of withering any branch whereon it perched; its body when dried preserved clothes from moths; it maintained wherever it was kept the peace of families; it was a safeguard against thunder; and was even believed to possess the power of augmenting hidden treasure. According to Gmelin its feathers are employed by the Tartars and Ostiaks for many superstitious purposes, thus showing that the classical nations were not alone in their ideas of ascribing wonderful powers to the bird. The Tartars believe that a kingfisher's feather which floats after being cast into the water, will act as a potent love-charm, in that when a woman is touched by such a feather, she must fall in love with its possessor. The skin of the kingfisher is preserved by the Ostiaks as a preservative against evil of every description. And even among civilized and intelligent persons, a magnetic influence has been ascribed to the bird, so that if suspended by a thread the breast will invariably turn to the north; and mariners, who, in particular, have valued the kingfisher, believe that the beak of a balanced bird will show the direction of the wind, even when kept in a house, and that the possession of its head forms a secure guarantee for fair weather, for success in love, and for many other desirable marks of good fortune. (Pl. CXL.–CXLI.)

KING OF (or AT) ARMS, in heraldry, an officer whose business is to direct the heralds, preside at their chapters, and have the jurisdiction of armoury. The origin of the title is doubtful. There are three kings of arms in England—Garter, Clarencieux, Norroy; the first is called *principal king of arms*, the second and third *provincial kings*. There is also an officer styled Bath King of Arms, attached to the order of the Bath, who takes precedence next to the Garter, but is not a member of the Herald's College. Clarencieux is said to be derived from Clarence, brother of Henry V., first king at arms for the south of England. Norroy (Norman French, *northern king*) is king of arms for the north of England. There are also Lion King at Arms for Scotland, and Ulster King of Arms for Ireland.

KING OF THE HERRINGS, the popular name given to the *Chimæra monstrosa*, or Northern or Arctic Chimæra, a fish also known in certain localities by the name of 'Sea-cat.' The former name was applied to it partly in allusion to a crown-like plate borne on the upper aspect of the head, and partly from its habit of following shoals of herrings. It feeds upon these fishes and other smaller kinds; but also appears to subsist on crustaceans and other lower forms of marine life. It is included in the order Elasmobranchii, and is thus a near ally of the sharks and rays. It forms the type of a sub-order—Holocephali—of the Elasmobranchii, the members of which are distinguished primarily by the mouth opening in front of the head, and not on its under surface, and by the single gill-aperture covered by a gill-cover or operculum. The Southern Chimæra (*Callorhynchus Australis*) is also included in this group, and this latter form is distinguished by having a curious hoe-like appendage attached to the snout. A species of the same genus (*C. Peronii*) is shown on Pl. CI.–CII. fig. 8. The King of the Herrings, or Northern Chimæra, inhabits the northern seas generally, and occurs occasionally on the British coasts. It varies from 3 to 4 feet in length, possesses a blunt, conical-shaped snout, and has an elongated, tapering tail, with unequal lobes. In the males, at the base of the ventral fins, bony appendages are found. The first fin-ray of the dorsal fin exists in the form of a strong sharp spine. The Northern Chimæra is of a grayish or silvery colour, interspersed with brownish spots. Linnæus called these fishes 'chimæras' from their somewhat singular and fanciful appearance. The Norwegians are said to employ the oil of the liver of this fish, as a remedy for certain diseases of the eye. The eggs are inclosed, like those of the sharks, &c., in horny capsules.

KINGS, BOOKS OF, 1 AND 2. These two books form one in the Hebrew canon. In the Septuagint version there are various omissions, additions, transpositions, and glosses, which do not in general appear to rest on any authentic authority, and sometimes bear evident traces of later invention. Besides their internal unity the books of Kings are closely connected with those which precede them in the canon, 1 and 2 Samuel, and even Judges and Ruth, so that Ewald supposes the whole of these books to be a single compilation, an opinion which has gained ground considerably. Taking the books of Kings alone there is internal evidence throughout that their compilation was subsequent to the destruction of the Jewish monarchy, and in the later chapters much to corroborate the Jewish tradition that Jeremiah, with whose book of prophecies they present many points of agreement, was the compiler. By whomsoever they were compiled these books, as well as Judges, Ruth, and Samuel, are evidently taken from a series of contemporary authorities, being, as shown by citation, the official annals as well as the prophetical writers of the successive periods. These authorities are often followed so literally that when a comment is introduced it is uncertain whether it is that of the original writer or the compiler; thus the expression which frequently occurs in reference to memorials of occurrences that they remain to this day sometimes implies the existence of the monarchy, the temple, or something else known not to exist in the time of the compiler. The books of Kings thus contain authentic accounts of contemporary history during the whole period of the Jewish monarchy. They begin with the close of the reign of King David, and the history is carried down consecutively to a period subsequent to the capture of Jerusalem and the destruction of the temple, embracing, according to the received chronology, a period of upwards of 400 years (B.C. 1015–588), and including the history of both the kingdoms of Judah and Israel. The facts recorded in regard to the foreign relations of these kingdoms from the conquest of Rehoboam by Shishak, king of Egypt, to the captivity in Babylon, have been remarkably confirmed by modern discoveries. The outline of events recorded in Kings is also frequently supplemented by much fuller details in the prophetic books, particularly Isaiah and Jeremiah. The text of the books of Kings is not considered by critics to be very pure. The chronology is in so unsatisfactory a state, so difficult to reconcile with other authorities, and in so many passages inconsistent with itself, that some critics have been driven to the extreme hypo-

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thesis that all the synchronic passages, those, namely, which synchronize the separate chronologies of the reigns of the kings of Judah and Israel, together with the important data in 1 Kings vi. 1, which serves to connect the beginning and the end of Jewish history, are interpolations of a systematic chronologist irreconcilable with the text. This hypothesis assumes not only the interpolation of numerous passages, but the transposition of various sections of the text. The books of Kings differ from the Chronicles in comprising the history of the whole of the Kingdom of Israel during its divided state, that is, of the separate kingdoms of Israel and Judah, while the Chronicles are occupied almost exclusively with that of Judah. It is also to be observed that the Kings contain much fuller notices of the contemporary prophets, while the Chronicles are more full in describing the temple worship and the ceremonials of the Levitical law. This may, perhaps, be regarded as confirming the hypothesis which ascribes the authorship of the former to Jeremiah the prophet, while the reputed author of the Chronicles was Ezra the priest.

KING'S ADVOCATE. See ADVOCATE OF THE CROWN.

KING'S BENCH. See QUEEN'S BENCH.

KING'S COLLEGE, Cambridge, was founded by King Henry VI. in 1441. Under the new statutes, which received the approval of the queen in council, 16th April, 1861, the collegiate body consists of a provost, not fewer than forty-six fellows, and not fewer than forty-eight scholars. The fellowships are open to all members of the college of sufficient standing. Twenty-four scholarships of £80 each of annual value are appropriated to the scholars of Eton College, also founded by Henry VI. Of the remaining twenty-four of similar value, twelve are open to all under-graduates of the college, and twelve to all British subjects under twenty years of age. All the scholarships are tenable till the holder is of M.A. standing, or becomes a fellow of a college. Several exhibitions were founded from old benefactions in 1871. There are also various prizes. The members of this college are exempt within the college from the authority of the proctors and university officers, the provost having absolute authority.

KING'S COLLEGE AND SCHOOL, London, is a proprietary institution vested in a body of shareholders. It was incorporated in 1828. The buildings form the east wing of Somerset House. It was established for the purpose of providing education in accordance with the principles of the Established Church. In the higher division there are four departments—theology, general literature, applied sciences, and medicine. In the school division boys are admitted on the presentation of proprietors between the ages of nine and sixteen. Church service forms a regular part of the routine. There is a library and a museum, the latter containing Babbage's calculating machine, and a collection of mechanical models and philosophical instruments belonging to George III., presented by Queen Victoria.

KING'S COUNSEL. See QUEEN'S COUNSEL.

KING'S COUNTY, an inland county, Ireland, province of Leinster, bounded N. by Westmeath, E. by Kildare, S. by Queen's County and Tipperary, W. by Tipperary, Galway, and Roscommon; area, 493,985 acres, of which 337,256 acres are arable. The total acreage under crops of all kinds in 1883 was 113,178, of which 46,399 were under grass and clover, 23,381 under oats. The total number of cattle in 1883 was 73,299; sheep, 99,800; pigs, 25,536. A large portion of the N. and N.E. part of this county is covered with the Bog of Allen, and of the S. with the Slieve Bloom Mountains; the extent of country occupied by both being estimated at 145,836 acres. The former, like all the other bogs here, reposes on limestone gravel; the latter consists of a nucleus of clay-slate, supporting flanks of sandstone; they do not rise to any great height, their loftiest summit being only 1689 feet high. They extend north-east to south-west, through a distance of about 15 miles. Granular limestone occurs in the N.W. of the county, and has been quarried. The soil is in some places very rich, but in others it is light and gravelly; at an average, it may be reckoned of a medium degree of fertility. A hill, called Croghan Hill, which consists of a protruded mass of trap conglomerate, is almost all under cultivation, and yields the most abundant white and green crops without any manure whatever. The principal produce is oats, wheat, and potatoes. The tillage farms are generally small, but there are some extensive grazing ones. The occupations are nearly altogether agricultural, manufactures being only for home consumption. King's County is divided into twelve baronies and fifty-one parishes; and returns two members to Parliament, both for the county. The assize and county town is Tullamore. Pop., which in 1841 was 146,875, was in 1881, 72,852. The number of emigrants from 1st May, 1851, to March 31st, 1881, was 41,979.

KING'S EVIL. See SCROFULA.

KING'S LYNN. See LYNN.

KINGSTON, a city of Ontario, Dominion of Canada, on Navy Bay, the north-east corner of Lake Ontario, 199 miles S.W. Montreal. The streets are regularly laid out at right angles to each other; and the houses, although in general having no pretensions to elegance, are, for the most part, substantially built of stone. The market-house is a spacious structure, containing news and reading rooms, and various public offices. The educational institutions are the Queen's University and College, a collegiate institution belonging to the Presbyterians, a mechanics' institute, an hospital, and other charitable establishments. The trade of the port is very considerable, and the harbour, which is commodious and well sheltered, is accessible to ships of large size. Its entrance is defended by two batteries. There are some valuable mineral springs in the town and neighbourhood. Kingston was founded in 1783, on the ground formerly occupied by Fort Frontenac; and it was incorporated in 1838. Pop. (1881), 14,093.

KINGSTON, the capital of the island of Jamaica, on the south coast, on a gentle slope. The streets are long and straight, and laid out with great regularity. The houses are generally built of brick, and are two stories high, having the fronts shaded by a piazza below, and a covered gallery above; the latter, from 12 to 14 feet wide, gaily painted with green and white, and formed by the roofs projecting beyond the brick walls or shells of the houses. In the upper part of the town every house stands detached from its neighbour in its little garden, filled with vines, fruit-trees, and stately palms, with a court of negro houses and offices behind. The principal public buildings are the English and Scotch churches; the former, which stands in a commanding position, is a large and elegant structure, with four aisles and a handsome tower and spire; an hospital, and various other charitable institutions, courthouse, free school, theatre, workhouse, new penitentiary, commercial subscription-rooms, barracks, and jail. The harbour, which is 6 miles long by 2 miles wide, is completely landlocked, being separated from the sea by a narrow slip of low land, along which there is excellent anchorage for vessels of any size. The entrance to the harbour, and the harbour itself, is defended by several formidable forts. The inclined plain on which Kingston stands is inclosed on the north by the

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loftiest ridge of the Blue Mountain chain, and the intermediate space agreeably diversified with country residences, and, near the mountains, with sugar estates. A railway between Kingston and Spanish Town, 10 miles west, was opened in 1846. Pop. estimated at 35,000.

KINGSTON-ON-HULL. See HULL.

KINGSTON-UPON-THAMES, a town of England, in the county of Surrey, on the right bank of the Thames, here crossed by an elegant stone bridge, and on the South-Western Railway, 12 miles from Hyde Park Corner. Its antiquity is proved by numerous Roman remains found in its vicinity, and the Saxon kings were crowned here from Edward the Elder to Ethelred II. The stone on which the kings were crowned is preserved within an iron inclosure near the market-place. In recent times Kingston has assumed a very improved appearance, and a new town has sprung up near the railway-station. Its principal buildings are an ancient cruciform church, several Dissenting chapels, a free grammar and other schools, a town-hall, market-house, military barracks, &c. There are here a large brewery and a distillery, and several flour and oil mills. Its trade is chiefly in malt. Pop. in 1881, 20,648.

KINGSTOWN, a seaport, Ireland on the south shore of Dublin Bay, 6 miles S.E. of Dublin, with which it is connected by railway. It consists of regular streets, and some fine terraces and other ranges of handsome buildings, among which is a fine town-hall, built in 1880. Its most interesting object is its magnificent harbour, commenced in 1816 by directions of the lords of the admiralty, and finished in 1859 at a cost of £825,000. There are two piers, an east pier 3500 feet long, and a west pier 4950 feet long, inclosing an area of 250 acres, with a depth varying from 15 to 27 feet. Kingstown has regular steam communication with Holyhead, and is visited annually by 1600 to 1800 vessels (exclusive of mail and passenger steamers), carrying upwards of 200,000 tons. Kingstown is a favourite resort of the Dublin citizens, and is much frequented for sea-bathing. Pop. of township in 1881, 18,586.

KING'S YELLOW, a pigment, the basis of which is orpiment or tersulphide of arsenic.

KINKAJOU (*Cercoleptes*). These carnivorous mammals are inhabitants of South America, and in the main are adapted for an arboreal life. They are most nearly related to the family of the Ursidæ or bears, which forms they closely resemble in their dental arrangement. They are plantigrade like the bears, that is, apply the whole sole of the foot to the ground in walking. The feet are provided each with five toes, which are not united together as in the more typical plantigrades. The canine teeth are of small size, and the molar teeth, being tuberculate, would seem fitted for an insectivorous or vegetable dietary. But in habits they appear omnivorous, and feed upon their smaller mammalian neighbours, upon birds and their eggs, upon insects, fruits, roots, &c. In outward appearance they bear a resemblance to the lemurs or lower monkeys. They are all of small size. The legs are short, the fur is close and woolly, and the tail is long and prehensile, and is used by these forms as an aid to progression among the trees of the forests in which they live. They appear to move abroad chiefly during the night. In captivity they become very tame and docile. They have an especial liking for honey, and are said to make forays on the nests of bees for the sake of the sweet store of these insects. They are generally included to form the family Cercoleptidæ, and the *Cercoleptes caudivolvulus* is the most familiar. (Pl. XXXIII.-XXXIV. fig. 16.)

KINO, or GUM KINO, an astringent substance used in medicine, a product of several different trees. It is similar in use to catechu, by which it is now generally superseded. African kino, derived from the *Pterocarpus erinaceus*, which is the best quality, is now seldom found in the shops; that most commonly used is the East India kino of the *Pterocarpus marsupium*, found on the Coromandel coast.

KINROSS, a town, Scotland, county of Kinross, is pleasantly situated at the west end of Loch Leven, 20 miles N. by W. Edinburgh; formerly a mean-looking place, but of late years greatly improved. Cotton-weaving, and the manufacture of tartan shawls, plaids, and other articles, are the principal branches of industry. Pop. of town in 1881, 1960.

KINROSS-SHIRE, a small inland county, Scotland, west of Fife, and entirely surrounded by that county and Perthshire; area, 49,812 acres, of which 4480 are water, consisting of Loch Leven, with a surface of 3300 acres, and some smaller lakes, most of which abound in fish. The borders are hilly, but the interior is generally level or slightly varied by gentle elevations. The general geological formation of the district is red freestone, but the higher hills are whinstone or basalt. There are quarries of limestone and freestone, and coal is found in the south. The soil in the low ground is clayey, sandy, and tolerably fertile. The total acreage under crops and grass in 1882 was 31,522, of which 7133 were under corn, 3609 under green crops, and 10,657 under permanent pasture. The number of cattle in 1882 was 5633; sheep, 26,694; agricultural horses, 704. The principal streams are the Garny, the South and North Queich, all of which fall into Loch Leven. Kinross, the county-town, and Milnathort, are the only towns in the county. Kinross-shire contains seven parishes, and unites with Clackmannanshire and certain parishes in the south-west part of Perthshire in returning a member to the House of Commons. Pop. in 1881, 6697.

KINSALE, a seaport town of Ireland, in the county and 12 miles south of Cork, agreeably situated near the mouth of the Bandon, which here forms a magnificent harbour, accessible to the largest ships. It occupies a steep acclivity, and has many of its houses excavated out of the solid rock, while others, perched on crags, present a very singular appearance. The principal buildings are an ancient parish church, with a tower terminating in a spire; a spacious Roman Catholic chapel, with rich internal decorations; a town-hall and jail; a fort commanding the harbour, infantry barracks, capable together of receiving 2000 men; several schools, a monastery and convent, a fever hospital, union workhouse, &c. Many of the inhabitants are employed in fishing. The exports consist chiefly of agricultural produce, and the imports of timber, coal, iron, and salt. Kinsale is a very ancient place, and has been repeatedly besieged. It sends one member to Parliament. Pop. in 1881, 5998.

KINTYRE. See CANTYRE.

KIOSK, an oriental pavilion, with a tent-shaped roof, open on all sides, and isolated. It is supported by pillars (commonly placed in a square), round the foot of which is a balustrade. It is built of wood, straw, or similar materials, and is chiefly erected to afford a free prospect in the shade, but it also serves to embellish a rural or garden view. The word *kiosk* is Turkish. This kind of pavilion has been introduced from the Turks and Persians into the English, French, and German gardens.

KIRBY, Rev. WILLIAM, a distinguished entomologist, was the son of a solicitor, and born at Witnesham Hall, Suffolk, on 19th September, 1759. He was educated at the grammar-school of Ipswich, and afterwards studied for the church at Caius College,

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Cambridge, where he took his degree of B.A. in 1781. Shortly afterwards he was appointed to the curacy of Barham, in Suffolk, of which, in 1796, he became rector. His love of natural history early developed itself, and he now, as the clergyman of a country parish, found ample scope for prosecuting his studies in that department of science. The subject which first mainly engaged his attention was botany, but he was induced by an accidental circumstance to abandon it for entomology, to which he soon became enthusiastically devoted. On the establishment of the Linnæan Society, in 1788, he was one of its first members, and in 1793 he contributed his first paper to its Transactions, entitled A Description of Three New Species of Hirudo. Numerous other papers followed from time to time. In 1802 appeared his work on English Bees, entitled Monographia Apum Angliæ (two vols. Ipswich), which established for him a European reputation, and brought him into correspondence with Fabricius, Latreille, and other foreign naturalists. A few years afterwards he formed a literary copartnery with Mr. Spence, for the purpose of constructing a popular work on entomology, and the result was the publication, in 1815, of the first volume of Kirby and Spence's Introduction to Entomology, of which the second volume appeared in 1817, and the third and fourth in 1826. This is one of the best popular treatises in connection with natural history that has ever appeared, and it achieved a great and deserved reputation, which, as it is almost exhaustive of the subject on which it treats, it will probably ever retain. It gives in the form of letters a familiar description of insects in all their phases as regards species, food, habits, and qualities, beneficial or destructive. In 1830 Mr. Kirby was appointed to write one of the Bridgewater Treatises (which see), and he accordingly produced his Habits and Instincts of Animals with reference to Natural Theology. He wrote a description of the Arctic insects for Captain Parry's Voyage for the Discovery of a North-west Passage, and also for Sir John Richardson's Fauna Boreali-Americana. Mr. Kirby was honorary president of the Entomological Society of London, fellow of the Royal, Linnæan, Zoological, and Geological societies, and honorary member of several societies abroad. He died at the advanced age of ninety, on 4th July, 1850. He was twice married, but had no family by either wife.

KIRCHER, Athanasius, a learned German Jesuit, born at Fulda in 1602. He was professor of mathematics, philosophy, and the oriental languages at Würzburg, when the arms of the Swedes disturbed his repose, and he repaired to Avignon, where he continued several years. He wished to return to Germany; but the pope called him to Rome, where he at first taught mathematics in the Collegium Romanum, and afterwards occupied himself in the study of the Egyptian hieroglyphics. He was subsequently professor of Hebrew and mathematics at Rome, where he died in 1680. Father Kircher was a good orientalist, as well as an excellent mathematician; but the fanciful nature of some of his studies has caused most of his productions to be considered rather curious than useful. In his attempts to unravel the hieroglyphics he occasionally fell into some singular absurdities. His industry as a writer was unwearied, the whole of his works occupying no fewer than twenty volumes in folio, eleven in quarto, and three in octavo. Among these are his Œdipus Ægyptiacus (four vols., 1652–55), Prodromus Coptus (Rome, 1636), Lingua Ægyptiaca restituta (Rome, 1644, 4to), Mundus Subterraneus (two vols.) In his Musurgia he lays claim to the invention of the Æolian harp, and in his Phonurgia Nova to that of the speaking-trumpet. His writings embrace the departments of philosophy, mathematics, physics, mechanics, cosmography, natural history, philology, history, and antiquity. They exhibit great learning, but are disfigured by many extravagances.

KIRGHIZ, Kirghis, or Kirghiz-Kazaks (Cossacks of the Steppes), a widely-spread nomadic people of Asia, of Turkish-Tartar race, who inhabit the steppes that extend from the lower Volga and the Caspian Sea in the west to the Altai and Thian-Shan Mountains in the east, and from the Sea of Aral and the Syr Daria in the south to the Tobol and Irtish on the north. The term Kirghiz, though applied by Europeans to the whole of these peoples, properly belongs only to the Kara-Kirghiz (Black Kirghiz, called also Burúts or Pruts). Those to whom Europeans give the name Kirghiz are called by the Asiatics Kazaks. The Kirghiz-Kazaks speak the Turkish dialect of the Uzbeks. In their physical type they belong to the Mongolian race. They profess the Mohammedan faith, though they do not practise polygamy; but the mass of them still adhere to the pagan superstitions inherited from their forefathers, and are sunk in ignorance. They are below the general average of European stature, and are remarkably healthy and vigorous. Their food is chiefly mutton and horse-flesh, with *koumiss* or fermented mare's milk, from which they extract an intoxicating spirit. They are indolent, pusillanimous, volatile, very avaricious, and frightfully vindictive. Almost all the labours, out-door and in-door, fall upon the women. Agriculture scarcely exists among them, but they possess many sheep, horses, and camels. Cattle and goats are not so numerous. Their dwellings consist of a *yurt* or hemispherical tent, the frame of which is of boughs, the covering of felt. Their manufactures are exclusively domestic, and consist of woollen cloths, felt, carpets, hair-ropes, leather, metal ornaments for horse-trappings, knives, &c. They carry on a trade by barter with the Chinese and Russians, exchanging sheep, horses, camels, cattle, wool, skins, &c., for tea, cutlery, silks, and other manufactured goods. A considerable portion of the Kirghiz dwell in Chinese territory or in Independent Turkestan, but the greater number of them are nominally under Russian dominion. Of these European Russia contains about 150,000. The Kirghiz steppes of Asiatic Russia, which now form the four provinces of Ural, Turgai, Akmolinsk, and Semipalatinsk, have a population of 1,450,000; and there were estimated to be about 700,000 Kirghiz in Russian Turkestan. The Kirghiz-Kazaks are divided into three bodies—the Little Horde (*orda*, a tent or encampment), dwelling in the region extending from the river Ural to the Sea of Aral and the Syr, and more numerous than the others together; the Middle Horde, north-east from the preceding; the Great Horde, extending from about Lake Balkash to the Chinese territories; the Burúts or Kara-Kirghiz, extend over the Alatau, Muztau, and other mountains about Khokan, Kashgar, and Yarkand. The Kirghiz steppes are collectively an undulating country, nowhere rising to any great height. Being of vast extent it differs considerably in different quarters, but its general character is uniform and monotonous. A great portion of the territory is arid and sterile, it is mostly covered with rank herbage, and seldom traversed by rivers. Salt lakes are exceedingly numerous in some parts. The climate is characterized by great extremes of heat and cold and excessive dryness. Tremendous hurricanes are common.

KIRKCALDY, a royal and parliamentary burgh and seaport, Scotland, county of Fife, on a spacious bay on the north shore of the Firth of Forth, 10 miles north of Edinburgh. It consists principally of one long irregular street, which, including suburbs, extends

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for about 3 miles west to east. The west part of this great thoroughfare stretches along the shore, which is a low sandy level; but towards the east the main street, as well as some of the lanes diverging from it, is built on an acclivity. It has a handsome town-hall, with an elegant spire; a number of churches, a burgh school, Philp's Institution, for educating and clothing the children of the poorer classes belonging to Kirkcaldy and some of the neighbouring towns; a people's-club and institute, a literary and a scientific association, &c. It has numerous flax-spinning mills, linen and damask factories, flour-mills, sailcloth and net factories, brewery, distillery, roperies, machine-factories, oil-cake works, potteries, collieries, brick and tile works, &c. It can boast of the largest linoleum and floor-cloth works in the world. The harbour is obstructed by a sandbank at its mouth, and is dry at ebb-tide. There is weekly steam communication with London, and daily with Leith, Grangemouth, and Glasgow. The foreign trade is with the Baltic and the north of Russia. The imports consist of flax, timber, whiting, and other articles; the exports are linen, jute, yarn, floor-cloth, cured herrings, and coal. Kirkcaldy, together with Burntisland, Dysart, and Kinghorn, constitutes the Kirkcaldy district of burghs, which sends one member to Parliament. Adam Smith, author of the Wealth of Nations, was born here. Pop. of parliamentary borough in 1871, 7748; of entire town, including Gallatown, Pathhead, and Sinclairtown, 18,874; in 1881, 23,288.

KIRKCUDBRIGHT, Stewartry of, a maritime county, Scotland, and, with exception of Wigtonshire, the most southern; bounded north by county Ayr, west by Wigton, north and east by Dumfries, and south by the Solway Firth and Wigton Bay; area, 582,982 acres, of which above one-fourth is reckoned arable. The total acreage under corn crops in 1882 was 32,982, under green crops 17,860, under clover and grasses in rotation 72,690, and under permanent pasture 56,241. The number of cattle in 1882 was 39,636; of sheep, 371,541; of agricultural horses, 3844. The coast-line, generally bold and precipitous, extends from the head of Wigton Bay to the Nith, a distance, exclusive of bays and inlets, of about 45 miles. The western part of this line is considerably indented, the larger openings being Fleet Bay, Wigton and Auchencairn Bays, and Urr Water. The surface in the interior is generally hilly, and in extensive districts mountainous, the chief elevations in the latter reaching the height of 2000 to 3000 feet. Granite is met with in several localities, the most conspicuous being Craignair, Creetown, and Criffel, Kirkcudbrightshire contains numerous metallic veins. Veins of lead and copper ore have been found, and also hæmatite iron-ore. The principal rivers of the county are the Dee and the Urr. Lakes are numerous, but generally small, with exception of Loch Ken, a beautiful sheet of water of great length, but very narrow. Although the general surface of the country may be characterized as rugged and barren, there are yet many beautiful and fertile, though small valleys, along the courses of the Urr and Dee. Arable husbandry has been greatly improved of late years; but the principal attention is paid to the rearing of cattle, which are mostly sent to England. The breed of horses peculiar to this and the adjoining county of Wigton, known as Galloways, is now almost extinct; its place being supplied by horses of a larger size, and more suitable for draught. The sheep on the moors and high grounds are mostly black-faced. In the lower districts Cheviots, South Downs, and Leicesters prevail. Oats constitute the principal crop; potatoes are also extensively cultivated, and turnips are everywhere grown. The salmon fisheries of the Dee and Urr are very valuable, especially the former. The county returns one member to Parliament. It contains twenty-eight parishes, and forms with Wigtonshire the district known by the name of Galloway. The principal towns are Kirkcudbright (the county town), Dalbeattie, and Castle-Douglas. A stewartry was originally a district of crown lands under the charge of a steward. By act 1 Vict. cap. xxxix., the word county occurring in any act of Parliament, unless otherwise provided, is to comprehend any stewartry in Scotland. Pop. (1881), 42,127.

KIRKCUDBRIGHT, a royal burgh and port, Scotland, capital of the stewartry of same name, on the left bank of the Dee, 25 miles south-west of Dumfries. It is a clean, well-built place, with an elegant Established and several other churches, a county hall and jail, an academy, &c. The trade consists in exports of agricultural produce, and imports of coal and lime. It has regular steam communication with Liverpool. It is one of the Dumfries district of burghs, which sends one member to Parliament. Pop. in 1881, 2571.

KIRKINTILLOCH, a market town and police burgh, Scotland, county of Dumbarton, 7 miles north by east of Glasgow, on the railway thence to Campsie. It consists of three principal and several subordinate streets, and has three Established churches, besides other places of worship; court-house, &c. Weaving lappets was till recently the chief occupation; but iron-foundries, cotton-factories, and chemical works have now been established. Police commissioners under the act of 1862 were adopted in 1871 for Kirkintilloch and Lenzie, and the corporation acquired the gas-works in 1878. A scheme for water supply was adopted in 1874. Pop in 1881, 7352.

KIRK-SESSION, a subordinate ecclesiastical court in Scotland connected with every parish, and consisting of the parish minister or ministers, and of so many elders. The kirk-session used to have the management of the parochial poor, but this is now intrusted to a parochial board. The chief business of the kirk-session is to superintend the morals of the parishioners, and administer the discipline of the church according to established laws. For this purpose it has the power to institute processes, to cite parties and witnesses, to examine witnesses on oath, and to pronounce sentences and inflict censures according to the evidence adduced. A record of its proceedings is carefully kept. Its proceedings and sentences are subject to the review of the presbytery of the district.

KIRKWALL, a royal and parliamentary burgh and seaport, Scotland, capital of the county of Orkney, on a bay on the east side of the island of Pomona or Mainland. It consists principally of a narrow street, with houses of antique appearance, and another modern street parallel to the former, and containing many substantial houses and handsome shops and hotels. The principal edifices are the magnificent old cathedral of St. Magnus (founded in 1137), the choir of which has long been used as the parish church; the old castle of the earls of Orkney, the ruins of the bishop's palace, in which King Haco died; the Free and United Presbyterian churches, large town and county buildings with prison attached, a public library and news-room, an hospital for the sick, town and county poorhouse, an endowed grammar and other schools, &c. An elaborate scheme of water and drainage works was completed between 1876 and 1879. The harbour, which has recently undergone much improvement, is secure and commodious, and the trade, both foreign and coasting, is considerable. Steamers ply regularly to Aberdeen, Leith, Lerwick, &c. Kirkwall unites with Wick, &c., in sending a member to Parliament. Pop. (1881), 3947.

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KIRSCHWASSER, a liqueur distilled in Germany and Switzerland from bruised cherries. When well made it resembles noyau; but the distillation of the stones, which contain prussic acid, sometimes gives it a nauseous taste, and even makes it poisonous.

KISCHINEV, or KISHENAU, a town, Russia, capital of the government of Bessarabia, on the Biak, a tributary of the Dniester. Formerly only a small miserable town, it is now adorned with numerous handsome buildings, both public and private, making it one of the handsomest in Russia. It has fourteen churches, a gymnasium, and ten other schools; a library, and extensive manufactures of woollen cloth, and an important commerce with the East. Pop. 112,137.

KISFALUDY, ALEXANDER, a Hungarian poet, who has exerted a powerful influence on the language, literature, and general advancement of his country, was born at Sumegh, county Szalad, in 1772, and received his education at Raab and Presburg. In the latter he commenced the study of law, but soon abandoned it, and in 1793 entered the Austrian army as a cadet. He made the campaigns of Germany and Italy, and managed amid the din of war to make considerable progress in foreign languages and literature. During a longer residence in Vienna, as a member of the royal Hungarian bodyguard, he devoted himself particularly to the learning of Spanish, and to the translating of Tasso into Hungarian. In 1801 he left the army, and being happily married employed himself almost exclusively in agriculture and in literary pursuits. His principal lyrical work, the first part of which was published anonymously in 1800, under the title of Ketergo Szerelem (Unhappy Love), and the second in 1807, under the title of Boldog Szerelem (Happy Love), met with universal acceptance, and gave him a first place among his native poets. He afterwards attempted the drama, in which he made Schiller his model, and was equally successful. The most deserving of notice are the historical dramas John Hunniades and Ladislaus the Cumanian. His Family Pictures, A Dardai Hax and A Lelkes Magyar Leany, rank among the best pieces of the Hungarian stage. He died in 1844. His brother Charles, who almost equalled him in the same walks of literature, predeceased him in 1830.

KISS. The mutual touching of the lips is one of the most natural expressions of affection among men. The child expresses its love by a kiss, and men in all stages of refinement do the same. The word *kissing* is the usual expression in Hebrew to signify adoration; and *adoratio* literally means *touching with the mouth*. With some nations, as the Germans and French, it is customary for men to kiss each other after a long absence, &c. Kissing the hand of the sovereign now forms part of the ceremonial of all European courts. Kissing the foot is a common oriental sign of respect. The later Roman emperors, whose court ceremonial was mixed with so many servile customs, first introduced this practice into the West. The popes have required it as a sign of respect from the secular power since the eighth century. Pope Constantine I. first had his foot kissed by the Emperor Justinian II. on his entry into Constantinople in 710. Valentine I., about 827, required every one to kiss his foot; and from that time this mark of reverence appears to have been expected by all popes. When this ceremony takes place the pope wears a slipper with a cross, which is kissed. In more recent times Protestants have not been obliged to kiss the pope's foot, but merely to bend the knee slightly. Even Catholic princes sometimes perform only the genuflexion. When the pope is elected he is placed on the altar, and the cardinals, first of all, perform the adoration. Each approaches the newly-elected pope and kisses his foot, then his knee, and is then embraced by the pope, and saluted on the cheek.

KISSINGEN, a watering-place of Bavaria, Lower Franconia, pleasantly situated on the left bank of the Saale, here crossed by a handsome bridge, 30 miles north of Würzburg. It is surrounded by walls flanked with towers, and has a magnificent bathing establishment. The springs, five in number, and all saline, contain a large quantity of carbonic acid gas, are used both internally and as baths, and are considered efficacious in gout and affections of the stomach and chest. Besides 10,000 visitors annually attracted by the baths, about 500,000 bottles of water are annually exported. A little north of the town the brine obtained from a saline stratum of vast depth, by a peculiar artesian process, annually furnishes about 1500 tons of the purest white salt. Pop. (1881), 3873.

KISTNA (black or dark blue; an incarnation of Vishnu), a river of India, which separates the Deccan from Southern India. It rises among the Western Ghâts, in the province of Bijapur, not above 42 miles from the Malabar coast, flows first south-east, and then generally east, passes through the south part of Haidarabad, where it receives the Bhema on its left, and the Tungabudra on its right bank, both flowing, like it, from the Western Ghâts. Previous to the junction it is commonly called the Krishna, a name which is frequently given to the whole river. The united river (to which the name Kistna is sometimes restricted) flows in a north-easterly direction along the frontier of Haidarabad and the Madras Presidency, and, turning south-east, crosses the Guntur district of the presidency, and falls into the Bay of Bengal in lat. 15° 50′ N., 200 miles north of Madras. Its course, including windings, is estimated at 700 miles. Flowing for the most part through a mountainous country, its channel is much broken by rapids; and, varying much in depth in different seasons, is not well adapted for inland navigation, though after entering the Guntur Circars it is ferried by large boats. The Kistna is, perhaps, richer in gems than any other river of India. In the dry season diamonds, cat's-eyes, onyxes, and chalcedonies are said to be found, as well as a minute portion of gold.

KIT, the name given in the British army to the minor articles of a soldier's outfit, shirts, hose, boots, brushes, &c. Since 1855 the recruit receives his kit free, and is re-supplied at a low price with the articles he may subsequently require.

KIT-CAT CLUB, the name of a club formed about 1688, originally for convivial purposes, but which soon assumed a political character, having in the reign of Queen Anne become the resort of Marlborough, Walpole, Addison, Steele, and other leading Whigs. The original place of meeting was Shire Lane, and the name of the club was derived from that of the person (Christopher Cat) who supplied it with mutton pies. The portraits of the members were painted by Sir Godfrey Kneller, on a scale adapted to the height of the walls of the club-room, giving a portrait of about three-quarters length; hence portraits thus reduced have been called *kit-cat*. The club was dissolved about 1720.

KITCHENER, DR. WILLIAM, born in 1775, was the son of a Middlesex justice, who was for many years a coal merchant in the Strand, and acquired a handsome fortune, which he bequeathed to his son. Dr. Kitchener was educated at Eton, after which he settled in London as a physician. Early in life he married, but a separation from his wife soon after took place by mutual consent, and he was left at liberty to employ his ample fortune in experimental

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cookery. He treated eating and drinking as the only serious business of life; and having caught the attention of the public by the singularity of his conduct, he proceeded to promulgate, under the title of Cook's Oracle, the laws of the culinary art, professedly founded on his own practice. He was accustomed to assemble his friends at a *conversazione* at his house on Tuesday evenings, and for the regulation of these meetings placed a placard over his chimney-piece, containing these words, 'At seven come, at eleven go.' He was a great stickler for punctuality, and kept a slate in his hall, on which his hours for receiving visitors were indicated. His appearance, his dress, his usages, his person, were all quaint. Besides his Cook's Oracle, Dr. Kitchener wrote Practical Observations on Telescopes (1815, reprinted for the fourth time in 1825, under the title of Economy of the Eyes); Apicius redivivus (1817); the Art of Invigorating and Prolonging Life (1822); also the Traveller's Oracle, published just after his death, in 1827, &c. In his private character Dr. Kitchener is represented as having been an amiable man, respected for his integrity, conciliatory manners, and social virtues.

KITCHEN-GARDEN. See HORTICULTURE.

KITE (*Milvus*). The kites are classified in the order of raptorial birds, and form of themselves the family Milvidæ. The bill in these birds is short, strong; the sides convex; and the edges sinuate or wavy; the upper mandible being strongly arched. The tarsi or ankles are short and firmly set, the wings being powerful and pointed, and the tail forked. The family possesses representatives in every quarter of the globe, the temperate and warmer climates being more favourite haunts than the colder areas. The common kite (*Milvus regalis*) and the black kite (*M. niger*) are the two species commonly found in Europe. The average size of the common kite is about 25 inches in length, the wings measuring about 5 feet from tip to tip. The black kite is found on the European continent, but chiefly in its southern portions. The American kite (*Nauclerus furcatus*), found in the warm and temperate areas of the New World, and the Mississippi kite (*Ictinia Mississippensis*), are the two chief American species. The former possesses a very long and deeply-forked tail. The food of these birds consists chiefly of small mammals, insects, and carrion. They are said occasionally to catch fish. In Asia, and particularly in India, the carrion-feeding habits of the kite are seen to perfection. The Govinda kite (*M. Govinda*) acts thus as a scavenger in cleaning the streets of Indian towns of offal and garbage. The nest of the kites is built of sticks, and is built in trees at some distance from the ground. The eggs number two or three at most, and are of a whitish colour, sparsely mottled with brown.

KITTO, JOHN, D.D., a valuable contributor to biblical literature, and one of the most successful examples of the pursuit of knowledge under difficulties, was the son of a jobbing mason at Plymouth, where he was born in 1804. After obtaining a very scanty education he began to assist his father, and met with a fall which deprived him of the sense of hearing. Now become a burden to his parents, who could not or would not support him, he was sent to the workhouse, and afterwards apprenticed to a shoemaker, who used him so cruelly that the magistrates cancelled his indentures. The workhouse again became his refuge; and there, notwithstanding his physical defect, he turned his talents and thirst for literature to such good account, that in 1823 he published a small volume of essays, which procured him patrons, and added considerably to his means of subsistence. Shortly afterwards he went abroad in the suite of Sir John Neill, the British envoy at the Persian court, and from 1829–33 acquired that familiar acquaintance with the East which he afterwards employed so happily in illustrating the Sacred Volume. Among his leading works are The Pictorial Bible (1835–38, three vols. 8vo, new edition in 1850, four vols. imperial 8vo); Pictorial History of Palestine (two vols. royal 8vo, 1841); Gallery of Scripture Engravings (1841–43, three vols. 4to, 1846–47); Cyclopædia of Biblical Literature (by various contributors, edited by Kitto. 1843–45, two vols. 8vo). An abridgment of the Cyclopædia was afterwards published, called the People's Edition; The Lost Senses: Deafness and Blindness (two vols. 8vo, 1845); Physical Geography of the Holy Land (two vols. 18mo, 1848); Daily Bible Illustrations: Morning Readings (1849–51, four vols. 12mo); Evening Readings (four vols. 12mo); with numerous other works of a similar character. In his latter years, when excessive labour and inadequate remuneration for it had seriously impaired his health, he enjoyed a pension of £100 a year from the crown. Never was pension better merited. His death, which he met with Christian calmness and fortitude, took place in Germany, at Cannstadt, a suburb of Stuttgart, the capital of Würtemberg, on 25th November, 1854.

KITZINGEN, a town of Bavaria, Lower Franconia, 10 miles east-south-east from Würzburg. It consists of the town proper, on the right, and a suburb, on the left bank of the Main, which communicate by a handsome bridge, and are both surrounded by walls, flanked with towers; is on the whole well built, contains three public squares, a town-house, Latin school, and hospital; and has manufactures of cotton-prints, basket-work, gunpowder, vinegar, and dye-stuffs; some shipping, a fishery, a large general and transit trade, and numerous mills. Pop. 6966.

KIWI-KIWI, the native name of the *Apteryx*, or wingless bird of New Zealand, of which several species have been described. These peculiar birds, included among the Cursorial, or running birds, are wholly confined to the New Zealand islands. The natives hunt them for the sake of the skins and feathers, from which they manufacture dresses and articles of decoration. See APTERYX and ORNITHOLOGY.

KIZIL-KUM, an extensive sandy desert in Asia, to the south-east of Lake Aral, occupying a great part of the space between the Amu Daria or Oxus and the Sir Daria, in what is now Russian territory, between lat. 41° and 44° N., and lon. 61° and 67° E.

KLAGENFURT, a town of Austria, Carinthia, in the government and 40 miles north-north-east of Laibach, on the Glanfurt and Glan. It consists of the town proper and four suburbs, and has several handsome squares and spacious streets. Among its public edifices are the cathedral, with a good altar-piece; the town church, with a bartizan and tower 280 feet high; the Landschafthaus, where the states of Carinthia used to meet; the bishop's palace, with its fine park; the town-house, lyceum, with library of 30,000 volumes; gymnasium, normal and other schools, several hospitals, and a general infirmary. The manufactures consist of fine woollens, silk goods, muslin, and white-lead; and the trade, chiefly transit, is considerable. Pop. (1881), 18,747.

KLAPROTH, JULIUS HEINRICH, an orientalist and traveller, born at Berlin in 1783, when very young engaged with much zeal in the study of the Asiatic tongues, particularly the Chinese. After he had made himself known by the publication of the Asiatic Magazine, commenced at Weimar in 1802, he became an associate of the Academy for Asiatic Tongues, at St. Petersburg. In 1805 he accompanied Count Golowkin, who was appointed ambassador to

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Pekin, but was obliged to return on reaching the frontiers, in consequence of the refusal of the Count to submit to some points of Chinese etiquette. On his return he was commissioned by the Academy of St. Petersburg, through the influence of Count John Potocki, who had early patronized him, to proceed to the lands of the Caucasus, and make researches as to the original natives of Asia. One fruit of his travels, in addition to the particular account given of them in the work entitled Reise in den Kaukasus und Georgien in den J., 1807, 1808, was the establishment of the Archiv fur die Asiatische Literatur, Geschichte und Sprachkunde. In 1812, having quitted the Russian service for reasons which have not been fully explained, he proceeded to Italy in 1814, and having taken up his permanent residence in Paris in 1815, was appointed professor of Asiatic languages, and retained this situation till his death, in 1835. Among his numerous writings, which always display great learning, but are much marred by the invidious attacks he is constantly making against other learned men, may be mentioned his Historico-Geographical Description of the Eastern Caucasus (Tableau historique, géographique, ethnographique, et politique du Caucase, &c., 1827), Description of the Russian Provinces between the Caspian and the Black Seas, Catalogue of the Chinese and Mantchu Books and MSS. in the Royal Library of Berlin, Asia Polyglotta, Collections of Egyptian Antiquities, and General View of Three Kingdoms. The last, translated from the original Japan-Chinese, is very important for the history of Japan.

KLATTAU, a town, Bohemia, capital of circle of same name, on a steep height in the beautiful and fertile valley of the Rasenbach, 73 miles s.w. Prague. It is surrounded by double walls and ditches, has three suburbs, is well and regularly built, and well paved, contains a handsome deanery church, a Jesuit college, now converted into barracks; a town-house, with a lofty tower, and a very large and fine-toned bell; a Dominican monastery, the buildings of which are used as a gymnasium; several other schools, and two hospitals; and has manufactures of woollen and linen cloth, and hosiery. It is an ancient place, suffered much during the Thirty Years' war, and has six times been almost burned down. Pop. 8986.

KLAUSENBURG (Hungarian *Kolosvár*), an Austrian town, the capital of Transylvania, situated on the Little Szamos, and consisting of an old and a new town, and fine suburbs. The town is surrounded with old walls, has a large market-place, several fine streets, a noble cathedral in the ancient German style, built in 1414 by King Sigismund; a town-house, Hungarian theatre, and several palaces of the nobility. There are here higher class gymnasia for Protestants and Catholics, a college for Unitarians, with a gymnasium; a school of surgery, &c. The town carries on an active trade, and has some manufactures, more especially of porcelain. There are salt works in the neighbourhood. Klausenburg is the Claudiopolis of the Romans, and many Roman coins, bronzes, &c., have been found. The inhabitants are mostly Magyars, mixed with Walachians and Germans. Pop. 29,923.

KLAUSTHAL, a town, Hanover, on the Zellerbach, opposite to Zellerfeld, which communicates with it by a bridge, and may be regarded as its suburb, 48 miles s.s.e. of Hanover. It occupies the top and sides of a hill in a bleak district, and consists for the most part of wooden houses covered with shingle. Its principal edifices are a church, court-house, mint, gymnasium, forest, and mining school, with a good collection of models. It is the principal mining town of the Hartz, and has in its vicinity mines which produce gold, silver, and lead, and have been worked for more than two centuries. One of the mines is 2000 feet below the level of the Baltic. Pop. (1880), 9007.

KLÉBER, Jean Baptiste, one of the most distinguished generals of the French revolution, was born at Strasburg in 1754. He was the son of a mason, and was brought up by a village curé his relation. He studied two years at Paris with a view to the profession of an architect, and returned to his native town at the age of eighteen. Two German nobles, whose defence he had taken without knowing them, sent him to a military school at Munich. He entered an Austrian regiment with the grade of sub-lieutenant in 1776; but being disappointed in his hopes of promotion, he abruptly quitted the Austrian army in 1783, and, returning to Strasburg, resumed his profession as an architect. The revolution re-opened to him the career of arms, and in 1792 he entered the fourth battalion of the Haut-Rhin, and obtained the appointment of adjutant-major. After the defence of Mainz, in which he served with distinction, he was sent as brigadier-general to La Vendée. Here, together with Marceau, he defeated the Vendeans in the decisive battle of Savenay, 27th Dec. 1794. After a brief interval he was sent to the army of the north as a general of division. He distinguished himself at Fleurus, and followed up the success of the French arms there by the capture of Mons, Louvain, and Maestricht (Nov. 1794). He afterwards commanded the left wing of the army of Jourdan, and directed both the passage of the Rhine at Düsseldorf and the subsequent retreat. In the campaign of 1796 he defeated the Prince of Würtemberg, and afterwards Prince Charles, at the head of a superior force; and the chief command having temporarily devolved on him, he was about to enter Frankfort when he was recalled (1797). Jealousy of the appointment of Hoche to the command of the army of the Sambre and Meuse caused him to retire, till Bonaparte selected him for a command in the expedition to Egypt. He was wounded in the assault on Alexandria. In the expedition to Syria he commanded the rear-guard, took Gaza and Jaffa, and gained the battle of Mount Tabor (1778–79). He also took part in the siege of Acre and the battle of Aboukir (25th July, 1799). When Bonaparte left Egypt he intrusted the command of the army to Kléber (22d August, 1799). The army was reduced in numbers by disease, as well as by battle, and cut off from supplies and reinforcements by the destruction of the French fleet at Aboukir; and Kléber deeming resistance useless concluded, through the intervention of Commodore Sydney Smith, the convention of El Arish (24th January, 1800), by which the French were to be conveyed home with arms and baggage. This convention was disowned by the English government, and the unconditional surrender of the French demanded by Admiral Keith. Kléber announced this demand to his soldiers, with his determination to resist to the last. With 8000 men he defeated an army of 80,000 under the grand-vizier, 20th March, 1800. He suppressed a revolt in Cairo, and was actively engaged in organizing means for the resubjugation of the country, when he was assassinated by a Mohammedan fanatic, 14th June, 1800.

KLEPHTES, properly *robbers*, is the name given to those Greeks who kept themselves free from the Turkish yoke in the mountains, and carried on a perpetual war against the oppressors of their country, considering everything belonging to a Turk a lawful prize, often, as may be easily imagined, exercising their profession on Greeks. During the war of independence these Klephtes furnished the Greeks with some of their best soldiers and leaders. Whole tribes, as the Suliotes and Chimariots in Epirus, and the

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Sphakiots in Crete, are to be numbered among them. See ARMATOLIC and CAPITANIS.

KLEPTOMANIA (Greek *kleptō*, I steal), tendencies to hoard and to appropriate articles irrespective of their value are frequently observed as symptoms of insanity. When the latter tendency takes the form of appropriating articles belonging to others it is properly called *kleptomania*, and is frequently, and sometimes successfully, pleaded in law courts as an excuse for theft. It is said that ladies in some diseases of pregnancy are specially liable to this mania. There are many instances of a morbid tendency to appropriate without adequate motive; and when such a tendency is proved the application of the criminal law is obviously rendered unsuitable, although if the public suffers from the tendency some other step may reasonably be taken for its protection. But in admitting the plea of *kleptomania* great caution is needed. If the mere position of the accused is allowed to weigh in the decision the law becomes unequal, and what is theft in one is kleptomania in another. Moreover this partiality is apt to encourage undoubted theft in the class in whose favour it is exercised. It is notorious that among ladies in good social position addicted to shopping, not a few instances have been found in which a habit of petty pilfering has been acquired. The articles taken seem frequently to afford no adequate temptation, but in other instances serious thefts have in like circumstances been perpetrated. If in the first class of cases the plea of *kleptomania* is too freely admitted, and the restraint imposed by fear of disgrace removed, an encouragement is given to the development of feminine greed, from which more serious consequences may naturally be expected. The mere position of the appropriater therefore, or the value of the article appropriated, should have no weight in determining on a plea of kleptomania. The circumstances of most importance to be considered are: (1) whether the article appropriated is or is not of probable utility to the appropriator; (2) whether art and concealment are used in appropriating it; (3) if a series of appropriations be referred to in proof of mania, whether the series does or does not indicate an adequate utilitarian motive in the appropriation. One clergyman, for example, had a mania for stealing countless umbrellas, another picked up Bibles by the hundred from the book-stalls. Numerous other stories of this kind are told, showing that there are real, and perhaps frequent instances of a habit of appropriation, which, whether originating in a covetous disposition or in unconsciousness of the nature of the act, can no longer be regarded as deliberate and responsible actions.

KLEVE, German for Cleves. See CLEVES.

KLIPPSPRINGERS (*Oreotragus*). The klippspringers (literally 'cliff-springers'), so named by the Dutch colonists of Southern Africa, form a genus of antelopes inhabiting the rocky and less accessible parts of mountains in that region, and are distinguished by their agility in climbing over the precipices and rocks of their abode. Like the European chamois (*Rupicapra tragus*), to which they bear some resemblance, the klippspringers are of moderate size. The vicinity of the Cape of Good Hope appears to be the area most frequented by these forms.

KLOOTZ, ANACHARSIS. See CLOOTZ.

KLOPSTOCK, FRIEDRICH GOTTLIEB, one of the most celebrated of the German poets, was born July 2, 1724, at Quedlinburg. His father, a senator of Quedlinburg, and an eccentric man, removed after his birth to Friedeburg, near Wettin, on the Saale, where the young Klopstock spent his childhood, and was subsequently placed at the gymnasium of Quedlinburg. At the age of sixteen he went to Schulpforte, near Naumburg. Here he made himself perfect in the ancient languages, acquired a decided predilection for the classical writers, and formed the resolution of writing a great epic poem, though he was not determined what subject to choose; and the reign of Henry the Fowler at that time attracted him most. In 1745 he studied theology at Jena, and commenced in solitude the first canto of his Messiah. In Leipzig, where he went the next year, he formed an acquaintance with Cramer, Schlegel, Rabener, Zacharia, and others, who then published the Bremische Beiträge, in which the three first cantos of the Messiah appeared in 1748, and excited universal attention. He underwent some severe criticism, on account of the novelty and originality of the form and spirit of his poem. The work made the deepest impression in Switzerland. In the summer of 1750 he went to Zurich, where much exertion was made to induce him to remain. In Denmark the three first cantos of his Messiah met with a very favourable reception, and Klopstock was invited by the minister Bernstorff to Copenhagen, with a small pension, to finish the poem. He departed in 1751, and travelled through Brunswick and Hamburg, where he became acquainted with a young lady, who was a great admirer of his poems, Margarethe or Meta Moller, the daughter of a merchant there. In Copenhagen he was received with every mark of kindness and esteem. In 1752 he again visited Hamburg, and in the summer of 1754 he returned thither, and was married to Meta. Their courtship is described in the letters of his wife to Samuel Richardson, afterwards published in that writer's correspondence. But he soon lost her. She died in childbed in 1758. From 1759 to 1763 he resided alternately at Brunswick, Quedlinburg, and Blankenburg, and afterwards in Copenhagen. In 1764 he wrote his Hermann's Schlacht (Battle of Arminius), and sent it to the Emperor Joseph, but not with the success which, in his patriotic enthusiasm, he had promised himself. After this he entered upon his investigations of the German language. In 1771, after Bernstorff had received his discharge, he left Copenhagen for Hamburg, under the character of Danish secretary of legation and counsellor of the margraviate of Baden. In Hamburg he finished his Messiah. In 1792 he married a second time. He died March 14, 1803. Purity and noble feeling were the characteristics of his mind. As a lyrical writer he is perhaps among the most successful of any age. He may well be called the Pindar of modern poetry; but he is superior to him in richness and deep feeling, as the spiritual world which he paints excels in intrinsic magnificence the subjects celebrated by the Grecian poet. His patriotism is strong and ardent, and his later odes, called forth by the French revolution, in which at first he took the warmest interest, and those in which he speaks of the German language and poetry, are distinguished by bold and original turns of expression. Owing to these, and to his frequent allusions to the northern mythology, he is often obscure to many readers; but the most illiterate cannot fail clearly to understand, and gratefully to venerate Klopstock as a writer of sacred poetry. He gained, however, the brightest and quickest fame by his epopee, the first cantos of which, by their prophetic grandeur and the magnificence of their description, their genuine patriarchal tone, and unfeigned sincerity of love and devotion, announced him a rival of Milton. Klopstock created for the Germans a new, strong, free, and genuine poetic language, and essentially influenced the form, by introducing the ancient classic measures, and especially the hexameter; but he was unduly prejudiced against rhyme. He acquired much reputation by his grammatical works. Klopstock's works were published at Leipzig, 1798–1817, twelve vols. 4to.

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KNAPSACK is the case in which a soldier carries his kit over his back. In the British army it is made of canvas painted black. The form of the knapsack, and the straps by which it is fixed, have recently been improved to adapt it to the form of the body. Knapsacks of various forms and materials are commonly used by pedestrian tourists.

KNARESBOROUGH, a parliamentary borough and market town, England, county of York (West Riding), beautifully situated on the left bank of the Nidd, 17 miles west by north of York, with which it is connected by railway. It contains a spacious market-place, from which several streets diverge; houses in general neat and substantial, and principally of stone. This town was formerly the seat of extensive linen and cotton manufactures, but these branches of industry have now almost entirely disappeared. The environs of the town are remarkably beautiful, and abound with objects of interest, including the ruins of the castle, founded in 1170, which afforded shelter to the murderers of Thomas-à-Becket, and formed a temporary prison for Richard I.; the dropping well, possessed of powerful petrifying properties; and several curious excavations, including St. Robert's chapel and cave, the former hewn in a Gothic form in the solid rock; and the latter the spot where Eugene Aram, a schoolmaster in Knaresborough, committed the murder for which he was executed fourteen years afterwards. Knaresborough returns one member to the House of Commons. Pop. in 1881, 5000.

KNEE, a crooked piece of timber having two branches or arms, and generally used to connect the beams of a ship with her sides or timbers. The branches of the knees form an angle of greater or smaller extent, according to the mutual situation of the pieces which they are designed to unite. One branch is securely bolted to one of the deck beams, and the other in the same manner strongly attached to a corresponding timber in the ship's side. By connecting the beams and timber into one compact frame, they contribute greatly to the strength and solidity of the ship, and enable her to resist the effects of a turbulent sea. In fixing these pieces it is occasionally necessary to give an oblique direction to the vertical or side branch, in order to avoid the range of an adjacent gun-port, or because the knee may be so shaped as to require this disposition. The scarcity of these pieces frequently obliges shipwrights to form their knees of iron.

KNEE, or KNEE-JOINT, that joint in the lower limbs of man which corresponds to the elbow in the upper, and is formed by the articulation of the femur or thigh-bone with the tibia, or large bone of the leg. The lower end of the femur terminates in two oblong rounded masses, called the *condyles* of the femur, which rest in two cavities in the upper part of the tibia; interposed between the two bones are the *semilunar cartilages*, which diminish the pressure of the femur on the tibia, and prevent the displacement of the former by increasing the surface and depth of the articular cavity. In front of the knee-joint is the *patella* or *knee-pan*, which adapts itself by two articular facets to those presented by the condyles of the femur, and gives attachment by its upper border to the tendon of the extensor muscles of the leg, while to its lower border is attached a strong ligament firmly uniting it with the tibia. The knee-pan serves as a pulley for the extensor muscles. The bones are also firmly connected by ligaments, the whole forming a joint capable of flexion and extension, and of a very slight rotatory movement.

KNELLER, SIR GODFREY, an eminent portrait-painter, born at Lübeck about 1648, was designed for a military life, and sent to Leyden to study mathematics and fortification, but, showing a decided bent for painting, was placed under Bol and Rembrandt at Amsterdam. He visited Italy in 1672, where he became a disciple of Carlo Maratti and Bernini, and painted several historical pieces and portraits both at Rome and Venice. On his return he was induced to visit England, in 1674; and having painted a much-admired family picture, which was seen by the Duke of York, the latter introduced the painter to Charles II., by whom he was much patronized. He was equally favoured by James II. and William III., for the latter of whom he painted the beauties at Hampton Court, and several of the portraits in the Gallery of Admirals. He also took the portrait of the Czar Peter for the same sovereign, who in 1692 knighted him, and made him gentleman of the privy chamber. Queen Anne continued him in the same office, and George I. made him a baronet. He continued to practise his art to an advanced age, and had reached his seventy-fifth year at his death, in 1723. His interment took place in Westminster Abbey, under a splendid monument erected by Rysbrach, on which appears an epitaph by Pope. The airs of his heads are graceful, and his colouring is lively, true, and harmonious; his drawing correct, and his disposition judicious. He displays a singular want of imagination in his pictures, the attitudes, action, and drapery being insipid, unvarying, and ungraceful.

KNIGHT, in modern usage, a non-hereditary title of honour bestowed by the sovereign of Great Britain. It entitles the bearer to be addressed by the term *Sir*, which is prefixed to his Christian name. Not being territorial or hereditary, this title is much less esteemed than that of baronet. It is frequently conferred on provincial dignitaries on the occasion of personal attendance on some member of the royal family, or in celebration of some event of local importance.

KNIGHT, CHARLES, a celebrated English editor and publisher, was born 15th March, 1791, at Windsor, where his father carried on the trade of a bookseller and publisher. His education was completed, 1802–5, at the classical school of Dr. Nicholas of Ealing, when he became an apprentice to his father. On completing his apprenticeship he went to London to acquire a practical knowledge of journalism, and on 1st August, 1812, he started, in conjunction with his father, the Windsor and Eton Express, which he continued to edit till 1826. During this period he extended his acquaintance with literature, particularly of its earlier periods, commenced to write poetry, and composed, among other pieces, a tragedy, Arminius, which was printed. He also, in 1820, commenced the publication of two cheap periodicals, the Plain Englishman, and the Etonian, edited by Praed. In 1820 he removed to London and purchased the Guardian newspaper, which he sold in 1822 in order to commence business as a publisher in Pall Mall. Knight's Quarterly Magazine was his first important venture, but although numbering Macaulay and Praed among its contributors it only reached its sixth number. He now projected the scheme of a national library, consisting of a condensed series of books of varied information; but a period of disaster to the publishing trade occurring, his business was broken up, and he undertook in 1827 the superintendence of the publications of the Useful Knowledge Society. This connection continued for nearly twenty years, and was the leading feature in his career. He not only sketched the general schemes of the society's publications, but afforded valuable suggestions to contributors as to details of plan and sources of information. In 1828 he projected the British Almanac and the Companion to the Almanac, and edited both for forty years. Until 1833 almanacs were subject

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to a stamp-duty, which by his exertions he got abolished. In 1829 he resumed business as a publisher on his own account, and commenced the Library of Entertaining Knowledge, which he edited and published throughout. He himself wrote the volumes on Menageries and The Elephant. In 1830 and 1831 he wrote the Results of Machinery, and the Rights of Industry, or Capital and Labour, for a series entitled the Working Man's Companion. Both had a very large circulation. In 1832 he began the Penny Magazine, which by the end of the year reached a sale of 200,000. He continued to act as its editor till 1845, when it was discontinued. In 1833 he commenced the Penny Cyclopædia, originally intended as a moderate-sized supplement to the Magazine, but which expanded into a work of twenty-seven volumes, forming one of the most complete works in the language. It was published under the auspices of the Useful Knowledge Society, but at Mr. Knight's own risk, and it entailed on him a heavy loss. The society's Gallery of Portraits was published by him at the same time. A series of illustrated works, comprising the Pictorial Bible, the Prayer-book, the Thousand and One Nights, Shakspere, and many others, was commenced in 1832. The Shakspere was edited by Mr. Knight himself, and has, both for its text and notes, taken a high place among the numerous editions of the great dramatist. His popular History of England, an original work, occupied him seven years, 1854–61. In 1865 he published another original work, Shadows of the Old Booksellers; in 1867, Begged at Court, a romance of the commonwealth period. He also published, in 1864–65, an autobiographical work brought down to the time of publication, entitled Passages of a Working Life during Half a Century, three vols. 8vo. Charles Knight died 9th March, 1873. Few men have done so much for the diffusion of sound literature and of scientific knowledge among the people. His own contributions to literature, particularly his edition of Shakspere, show no mean taste, capacity, and judgment. Even collateral arts, such as wood engraving, were greatly promoted by his extensive undertakings as a publisher, and it is not too much to say that the Society for the Diffusion of Useful Knowledge owed its distinction chiefly to his superintendence.

KNIGHT, RICHARD PAYNE, a patron of learning and the fine arts, to the study and encouragement of which he devoted a great portion of his time and ample fortune. His father, from a dread lest his son's constitution should be impaired by the discipline of a public school, kept him at home till his fourteenth year; but on his decease young Knight was placed at a large seminary, where he soon distinguished himself by his progress in classical literature, his favourite study. His splendid collection of ancient bronzes, medals, pictures, and drawings, in his museum at his house in Soho Square, gave equal proofs of his taste and liberality. This collection he bequeathed at his death to the British Museum. His principal writings are, Remains of the Worship of Priapus, lately existing in Naples, and its Connection with the Mystic Theology of the Ancients (4to, 1786); an Analytical Essay on the Greek Alphabet (4to, 1791); Analytical Inquiry into the Principles of Taste (8vo, 1805); and Prolegomena in Homerum, reprinted in the Classical Journal. He was also author of some poems. He died in 1824.

KNIGHTHOOD. See CHIVALRY.

KNIGHT SERVICE, the original and most honourable species of feudal land tenure. The extent of land constituting a knight's fee was twelve ploughlands, equal, according to some authorities, to 800, according to others, 680 acres. The tenure was granted as a pure donation, the words used being *dedi et concessi;* the investiture was a public delivery of the land itself by the lord to the vassal, for which homage was done in the presence of the other vassals, and fealty sworn by the vassal to the lord. The holder of land by knight service was bound to attend his lord to the field on horseback, armed as a knight, for forty days in every year if required. The holder of half a knight's fee attended twenty days, and the holders of smaller fractions in proportion. Knight service was abolished by 12 Charles II. cap. xxiv., freehold taking its place.

KNIGHTS OF ST. JOHN. See JOHN (KNIGHTS OF ST.)

KNIGHTS OF THE SHIRE, members of Parliament representing counties or shires, in contradistinction to citizens or burgesses representing boroughs. Formerly the freeholders in each county were required to return two knights or gentlemen of worth as their representatives in Parliament, whose expenses during their sitting in Parliament they were required by Henry VIII. cap. xi. to bear. By 9 Anne, cap. v., the representatives were required to have a property qualification to the extent of £600 per annum of freehold estate. By the Reform Acts of 1832, 1867, &c., various changes have been made in the representation: the property qualification of members has been abolished, the constituencies have been enlarged, and the representation has been redistributed. See BRITAIN—B. the Parliament; BALLOT, ELECTION, &c.

KNIGHTS TEMPLARS. See TEMPLARS.

KNIPPERDOLLING, BERNHARD. See ANABAPTISTS.

KNITTING, an industrial and ornamental art allied to weaving, but of much later origin. It does not appear to be more than three or four centuries old, and seems to have been first used in the manufacture of stockings. It consists in forming a series of loops with a single thread, through which another row of loops is passed, and so on consecutively. In hand-knitting steel wires are used to form the loops on. For manufacturing purposes hand-knitting has been entirely superseded by machinery, which is constantly receiving new improvements. Hand-knitting, however, as it requires little attention, still forms an agreeable domestic occupation for ladies, and helps many females in humble life to eke out a precarious subsistence.

KNOLLES, or KNOWLLES, RICHARD, historian, was entered at the University of Oxford about 1560, and became a fellow of Lincoln College, which he left to be master of the free school of Sandwich, in Kent. He died in 1610. He wrote a General History of the Turks (published in 1603 and 1610), the style of which is highly commended by Johnson, Hallam, and other critics. An improved edition, with continuations, by Sir Paul Rycaut and Roger Manley, was published in three vols. folio, 1687–1700; Lives and Conquests of the Ottoman Kings and Emperors, continued to and printed in 1621.

KNOT, in navigation, a large knob formed on the extremity of a rope, generally by untwisting its ends, and interweaving them regularly among each other; of these there are several sorts, differing in form, size, and name, as diamond-knot, knop-knot, overhand-knot, reef-knot, shroud-knot, stopper-knot, single-wall knot, double-wall knot. The sheepshank-knot serves to shorten a rope without cutting it, and may be presently loosened. The wall-knot is so made with the lays of a rope that it cannot slip, and serves for sheets, tacks, and stoppers. Knots are generally used to act as a button in preventing the end of a rope from slipping through the hole of a dead-eye, or through the turns of a laniard, by which they are sometimes made fast to other ropes.

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KNOT is also used as a nautical synonym for a geographical mile. The log-line is divided by knots into sections of $\frac{1}{120}$th of a geographical mile, hence the number of sections run out in half a minute indicates the number of *knots* or geographical miles per hour at which the ship is going.

KNOUT, an instrument of punishment in Russia, being a whip formed of thongs of skin artificially hardened, and pointed with iron. It was formerly in use in the army, but a few strokes only are now inflicted, as a disgrace, in case of dismissal. It is still sometimes used for criminals. One hundred strokes of the knout were considered equivalent to a sentence of death, the victim rarely surviving the operation. If he survived, the punishment was completed by banishment to Siberia. The thongs of the knout are grooved before being hardened, which causes it to cut the skin. After inflicting the blow, the executioner draws it along horizontally, which tears the wound. It is said an expert executioner can kill with the third blow. The nobles were exempted from the knout, but the exemption was not always observed.

KNOWLES, JAMES SHERIDAN, dramatist, was born 12th May, 1784, at Cork, where his father, James Knowles (the author of a revised edition of Walker's Dictionary), was a teacher of elocution. In 1792 James Knowles removed with his family to London. Sheridan received his education from his father. He began to write plays very early, having made several at from twelve to fourteen years of age, which have not been preserved. His literary tastes brought him early into contact with Hazlitt, Coleridge, and Lamb, into whose fraternity he was admitted. About 1798 he removed to Dublin, where he made an attempt to come out as an actor at the Crow Street Theatre, but was not favourably received. He afterwards became an actor and singer in a theatrical company at Waterford. He wrote a play for this company called Leo, or the Gipsy, which has not been preserved, but in which Edmund Kean, then a member of the company, played the principal part, in 1809. He also published by subscription a volume of fugitive poems. He afterwards became a teacher of elocution in Belfast, where he began to write regularly for the stage. His tragedy of Caius Gracchus was performed in 1815 with success, and from this time he had a prosperous career as author, actor, and lecturer. About 1845 he retired from the stage, became afterwards a Baptist preacher, and published several theological works. In 1849 he received a pension of £200 a year from government. He died at Torquay, 1st Dec. 1862. The following are among his principal works: Caius Gracchus (brought out at Belfast), 1815; Virginius (Glasgow), 1820; William Tell (Drury Lane), 1825; The Hunchback (Covent Garden), 1832; The Wife of Mantua (Covent Garden), 1833; The Love-chase (Haymarket), 1837; Love (Covent Garden), 1839. In 1847 he published Fortescue and George Lovel, two three-volume novels of no great merit. A collective edition of his dramatic works was published in 1843, and a revised edition in 1856. The Rock of Rome, or the Arch-heresy, appeared in 1849; The Idol Demolished by its own Priest, in 1851. He was also an occasional contributor to periodicals. His Virginius has been pronounced the best acting tragedy on the modern stage; and Allan Cunningham says that his dramas are full of impressive groupings, and that his Virginius, his Beggar's Daughter, and his Wife of Mantua, all contain scenes of perfect truth and reality, such as are surpassed by no modern dramatist. Of the Lectures on Dramatic Art which he delivered, Wilson says in the Noctes Ambrosianæ, 'They are admirable, full of matter, elegantly written, and eloquently delivered.'

KNOX, JOHN, the chief promoter of the reformation in Scotland, was descended from an ancient family, and born at Gifford, in East Lothian, in 1505. His ancestors, by his own account, were retainers of the earls of Bothwell. He began his education at the grammar-school of Haddington. About his subsequent career there seems to be considerable dubiety. There is one statement that he entered the University of Glasgow, or of St. Andrews, in 1521, and another that he began his university career in the latter university in 1524. He is said to have had Major for his theological teacher. Major appears to have been connected with both universities: Glasgow till 1522, St. Andrews at a subsequent date unascertained. He became a priest before the legal age, twenty-five years, consequently before 1530. About this time he began to teach in St. Andrews. While here he gradually adopted the principles of the Reformed faith, of which he became an avowed advocate about 1542. Of the history of this transition of opinion little is known, although many obvious causes in the circumstances of the times are assigned for it. He was degraded from the priesthood, and compelled to flee from St. Andrews. He now entered the family of Douglas, of Longniddrie, as tutor to his sons and those of the laird of Ormiston. Under their protection he preached in the neighbourhood. He also became a follower of Wishart, upon whom he waited when he preached in Lothian, with a two-handed sword. He was persecuted by Cardinal Beaton and his successor, Hamilton, and at length compelled to flee from place to place till he thought of retiring to Germany, but was persuaded by the fathers of his pupils to take refuge with the assassins of Beaton in the Castle of St. Andrews. Here he preached the principles of the Reformation with extraordinary boldness until the castle of St. Andrews surrendered to the French in 1547, when he was carried with the garrison into France, and remained a prisoner on board the galleys until the latter end of 1549. Being then set at liberty, he passed over to England, and, arriving in London, was licensed either by Cranmer or the Protector Somerset, and appointed preacher, first at Berwick, and afterwards at Newcastle. In Dec. 1551 he was appointed chaplain to Edward VI., and preached before the king at Westminster, who recommended Cranmer to give him the living of Allhallows, in London, which Knox declined, not choosing to conform to the English liturgy. It is said that he refused a bishopric, regarding all prelacy as savouring of the kingdom of antichrist. He, however, continued his practice as an itinerant preacher until the accession of Mary, in 1554, when he quitted England, and sought refuge at Geneva, where he had not long resided before he was invited by the English congregation of refugees at Frankfort-on-the-Main, to become their minister. He unwillingly accepted this invitation, at the request of John Calvin, and continued his services until embroiled in a dispute with Dr. Cox, afterwards bishop of Ely, who strenuously contended for the liturgy of King Edward. Knox, in his usual style of bold vituperation, having in a treatise published in England called the Emperor of Germany as great an enemy to Christ as Nero, his opponents accused him to the senate of treason, both against the emperor and Queen Mary; on which he received private notice of his danger, and again retired to Geneva, whence, after a residence of a few months, he ventured, in August, 1555, to pay a visit to his native country. Finding the professors of the Protestant religion greatly increased in number, and formed into

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a society under the inspection of regular teachers, he finally joined them, and produced so great an effect by his exertions, both in Edinburgh and other places, that the Roman Catholic clergy, alarmed at his progress, summoned him to appear before them in the church of the Blackfriars, in that metropolis, May 15, 1556. This summons he purposed to obey, resting on the support of a formidable party of nobles and gentry, which so alarmed his opponents that they dropped the prosecution. Thus encouraged, he continued preaching with additional energy and boldness, and was even induced to write to the queen regent, Mary of Lorraine, a letter in which he earnestly exhorted her to listen to the Protestant doctrines. While thus occupied, he was strongly urged to pay a visit to the English congregation at Geneva; and he accordingly departed for that place in July, 1556. He was no sooner gone than the bishops summoned him to appear before them; and, as that was impossible, they passed sentence of death against him as a heretic, and burned him in effigy at the cross at Edinburgh. Against this sentence he drew up an energetic appeal, which was printed at Geneva in 1558, previously to which he was invited to return to Scotland, and had actually reached Dieppe on his way, when he received other letters recommending delay; which epistles he answered by such strong remonstrances against timidity and backsliding, that those to whom he addressed them entered into a solemn bond or covenant, dated Dec. 3, 1557, 'that they would follow forth their purpose, and commit themselves, and whatever God had given them, into his hands, rather than suffer idolatry to reign, and the subjects to be defrauded of the only food of their souls.' Knox, in the meantime, had returned to Geneva, where he published his treatise entitled the First Blast of the Trumpet against the Monstrous Regimen of Women, chiefly aimed at the cruel government of Queen Mary of England, and at the attempt of the queen regent of Scotland to rule without a Parliament. A Second Blast was to have followed; but the accession of Queen Elizabeth to the throne of England, who was expected to be friendly to the Protestant cause, prevented it. In May, 1559, he returned to Scotland. He intended to visit England on his way, but owing to the resentment of Elizabeth at his late treatise he was refused a passage. The queen regent had summoned the reformed preachers to Stirling to answer for their conduct. Knox and others accompanied them to Perth, but the queen, alarmed by the number of their supporters, promised to stop the trial if they would proceed no further. When they complied with her request, and many of them had returned home, the queen caused them to be cited at Stirling, and outlawed for non-appearance. The day this intelligence arrived in Perth Knox preached in public and inflamed the people by a vehement harangue against idolatry. The indiscretion of a priest, who, immediately on the conclusion of this discourse, was preparing to celebrate mass, precipitated his hearers into a general attack on the churches of the city, in which the altars were overturned, the pictures destroyed, the images broken, and the monasteries almost levelled to the ground. These proceedings of the mob were censured by the reformed preachers, and by the leaders of the party. From this time Knox continued to promote the Reformation by every means in his power, and by his correspondence with the secretary Cecil was chiefly instrumental in establishing the negotiation between the Congregation and the English, which terminated in the march of an English army into Scotland. Being joined by almost all the chief men of the country, these forces soon obliged the French troops, who had been the principal support of the regent, to quit the kingdom; and the Parliament was restored to its former independence. Of that body, the majority had embraced Protestant opinions, and no opportunity was omitted of assailing the ancient religion, until at length the Presbyterian plan recommended by Knox and his brethren was finally sanctioned, the old ecclesiastical courts being abolished, and the exercise of religious worship, according to the rites of the Romish Church, prohibited. In August, 1561, the unfortunate Mary, then widow of Francis II., king of France, arrived in Scotland to reign in her own right. She immediately began the regular celebration of mass in the royal chapel, which, being much frequented, excited the zeal of Knox, who was equally intolerant with the leaders of the conquered party; and in the face of an order of the privy-council, allowing the private mass, he openly declared from the pulpit, 'that one mass was more frightful to him than 10,000 armed enemies landed in any part of the realm.' This freedom gave great offence, and the queen had long and angry conferences with him on that and other occasions, in which he never paid the slightest homage either to sex or rank. He preached with equal openness against the marriage of Mary; and Darnley, after his union, being induced to hear him, he observed, in the course of his sermon, that 'God set over them, for their offences and ingratitude, boys and women.' In the year 1567 he preached a sermon at the coronation of James VI., when Mary had been dethroned, and Murray appointed regent. In 1572 he was greatly offended with a convention of ministers at Leith, for permitting the titles of archbishop and bishop to remain during the king's minority, although he approved of the regulations adopted in reference to their elections. At this time his constitution was quite broken, and he received an additional shock by the news of the massacre of St. Bartholomew. He had, however, strength enough to preach against it, which he desired the French ambassador might be acquainted with, but soon after took to his bed, and died, Nov. 24, 1572. He was interred at Edinburgh, several lords attending, and particularly the Earl of Morton, that day chosen regent, who, when he was laid in his grave, exclaimed, 'There lies he who never feared the face of man, who hath been often threatened with dag and dagger, but yet hath ended his days in peace and honour; for he had God's providence watching over him in an especial manner when his life was sought.' Robertson, in his History of Scotland, commenting upon the severity of his deportment, impetuosity of temper, and zealous intolerance, observes, that the qualities which now render him less amiable, fitted him to advance the Reformation among a fierce people, and enabled him to encounter dangers, and surmount opposition, to which a more gentle spirit would have yielded. John Knox was a man of exalted principles, great intellectual energy, undaunted intrepidity, and exemplary piety and morality. He was twice married, and had two sons by his first wife, and three daughters by his second, one of them married to the Rev. John Welch. His works comprise liturgical manuals, devotional treatises, and controversial tracts. Among them is a Historie of the Reformation of Religioun within the Realm, in five books, first edition, with his Life, by David Buchanan (Edinburgh, 1584). A more correct edition of the History, together with the miscellaneous works of Knox, was edited by David Laing; the History, in two vols., 1846–48; the Miscellaneous Works, in two vols., 1854–55; The Liturgy of the Church of Scotland, or John Knox's Book of Common Order, edited by Rev. John Cumming, was published in 1840. See M'Crie's Life of Knox.

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KNOX, Vicesimus, D.D., an eminent divine, author of a variety of works both in theology and polite literature. He was born December 8, 1752, and educated at Oxford. On the death of his father he was chosen his successor in the head-mastership of Tunbridge grammar-school, over which he presided thirty-three years, till, retiring in 1812, he was himself in turn succeeded by his son. His works, many of which have been translated into various European languages, are—Essays, Moral and Literary (three vols. 8vo and 12mo); Liberal Education (two vols. 8vo and 12mo); Winter Evenings (three vols. 8vo and 12mo); Personal Nobility, or Letters to a Young Nobleman (one vol. 12mo); Christian Philosophy (two vols. 12mo); Considerations on the Nature and Efficacy of the Lord's Supper (one vol. 8vo); and a pamphlet on the National Importance of Classical Education, with a variety of sermons on different occasions; expurgated editions of Horace and Juvenal; and a series of selections from the works of the best English authors, generally known as Elegant Extracts and Elegant Epistles. Dr. Knox wrote the Latin language with great purity and elegance, both in prose and verse. He died Sept. 6, 1821.

KNOXVILLE, a town, United States, Tennessee, capital of Knox county, on a height above the right bank of the Holston, at the junction of the East Tennessee and Georgia and the East Tennessee and Virginia Railways, 160 miles E.S.E. Nashville. It is the chief commercial place of East Tennessee, and is rapidly increasing in size and importance. It contains a university, several academies, the state asylum for the deaf and dumb, glass-works, and a large carfactory. Population (1880), 9693, or including the closely connected suburbs, 15,450.

KNUTSFORD, a market-town, England, county of Chester, 23 miles N.E. by E. of Chester. In general appearance the town has improved of late years. The ancient parish church has been repaired and modernized, and St. Cross parish church rebuilt. A good market-hall has recently been erected. Other public buildings are several Dissenting chapels, a free grammar and other schools, &c. Pop. 4305.

KOALA (*Phascolarctos cinereus*). The koala, a marsupial mammal, allied to the kangaroos, &c., is confined to the Australian province, where it is known as the native 'sloth,' native 'boar,' or native 'monkey.' Another species besides the *P. cinereus* is known, but the koala is the only one regarding which we have any definite information. It is chiefly found in New South Wales, and is adapted for an arboreal existence. The body is about 2 feet long, the fur being of a slate-gray colour, and the ears tufted with long hairs. The tail is quite abortive, but the want of this appendage—so useful when of prehensile kind to arboreal animals—is compensated for by the possession of strong curved claws, which assist the koala in its climbing movements. The feet are further fitted for grasping objects, and the disposition of the toes or digits assists in rendering the feet admirably adapted for climbing. Thus the great toes of the hind feet, as in most monkeys, can be opposed to the other digits, so that objects may be seized between them; and in the fore-limb the thumb or pollex and fore or index finger can together be opposed to the other fingers. The koala feeds on the leaves and soft parts of trees, but appears occasionally to burrow in search of roots. The young, like those of most marsupials, are carried in the characteristic pouch, but when sufficiently grown they are carried upon the shoulder of the mother. The koala is included in the carpophagous or fruit-eating section of the Marsupialia, and is regarded as being structurally intermediate between the kangaroos and phalangers.

KOBOLD, a species of elf in the popular superstition of Germany. It corresponds to the English *goblin*. The kobold is connected with a house or a family, and appears in bodily shape. Though inclined to mischievous teazing, they do on the whole more good than evil to men, except when irritated. In the mines they are thought to appear, sometimes in the shape of a blue flame, sometimes in that of a dwarfish child, and to indicate rich veins. They do the miners mischief when disturbed by them.

KOCK, Charles-Paul de, novelist, was born at Passy 21st May, 1794. He was the son of a Dutch banker who had established himself at Passy during the revolution, and who died on the scaffold with the Hébertists. He was born some months after the execution of his father, and was always, in the phraseology of the French republicans, a *réactionnaire enragé*, although his writings contain little of politics. At the age of fifteen he was placed by his mother in the banking-house of Scherer and Finguerlin. Here he composed his first novel, L'Enfant de ma femme, the title of which so shocked his employers that they begged him to offer his services elsewhere. He went instead to seek a publisher, in which he was successful, and his reputation was soon established by such works as Georgette (1820); Gustave, ou le Mauvais Sujet (1821); Mon Voisin Raymond (1822). The last is regarded as the typical romance of its kind. Indeed it is said that in all his novels Paul de Kock introduces the same characters and incidents, varying only the plot and accessory details, so that a French critic (Jouvin) asks, 'Ought we to say the romance or the romances of Paul de Kock?' To render these uniform types and incidents always fresh and amusing is the merit that has been claimed for Paul de Kock. His scene is cast in the lower ranks of middle-class life. His narrative is a constant succession of stirring incidents without catastrophe. The incidents are always gay and lively, frequently somewhat gross, but scarcely to the extent of indecency. At least it is pled that if his narrative is somewhat scantily clad in morality, his dénouement is always irreproachable. Some of his romances also, as André le Savoyard and Georgette sans Cravatte, have a simple and touching interest without being indebted to sensational incidents. The worst feature of Paul de Kock's works is his style, which is barely presentable, a fault evidently due to deficiency of education. This accounts for his popularity being greater abroad than at home, as the defects of style disappear in translation. In Italy and Spain even the novels of other writers are attributed to Paul de Kock in order to make them sell. Paul de Kock lived in Paris in the Boulevard Saint Martin during the last forty years of his life, and continued to write to the last. He died 29th August, 1871. Besides his novels, which are too numerous to mention, he wrote some dramas, chiefly taken from them. A collection of his works was published in six vols. 4to, illustrated, in 1849–52.

KOH-I-NOOR. See Diamond.

KOHL-RABI (*Brassica oleracea caulo-rapa*) is a cultivated variety of the cabbage, distinguished by a swelling at the neck of the root, which is eaten, and when gathered before it is quite ripe has an excellent flavour. It is used for feeding cows, for which it is superior to turnip, as it does not give so pronounced a flavour to the milk. Its cultivation is not much attended to in England except in the south.

KOLA, a town of Russia, in the government of Archangel, on the Kola, near its mouth in the Bay of Kola, derives its chief importance from being the best and indeed the only safe harbour on a long stretch of the Lapland coast, rendering it the usual resort of the Russian vessels engaged in the northern

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fishing trade, in connection with which the inhabitants find their chief employment. Pop. 743.

KOLA NUTS. See COLA.

KOLAPUR, a native state, India, between lat. 15° 58′ and 17° 17′ N.; lon. 73° 47′ and 74° 46′ E.; area, 2778 miles. It slopes from the culminating ridge of the Western Ghâts, forming its west boundary towards the eastern plains, which have still on its east frontier an elevation of 1500 to 1800 feet. In the west some summits of the Ghâts within its limits rise from 3000 to 4000 feet. The drainage is by the Kistna directly, and through its tributary Wurna and numerous mountain torrents. The soil, composed for the most part of disintegrated trap rocks and laterite, is very fertile. The rulers of Kolapur trace their descent from Sivajee, the celebrated founder of the Mahratta Empire. Pop. (1881), 800,267.

KOLLIN (properly *Neu-Kolin*), a town, Bohemia, 35 miles east by south of Prague, picturesquely situated on an elevated rock on the left bank of the Elbe, and crossed by the railway from Prague to Vienna. It is surrounded by a wall, and is well built; has a town-hall and several churches, and a botanic garden. It has manufactures of cotton and of potash, and a trade in gems, particularly cornelians, garnets, and topazes, which are found in the neighbourhood. Frederick the Great was defeated here by Marshal Daun, 18th June, 1757. Pop. (1880), 11,332.

KOLOMEA, a town, Austria, Galicia, 108 miles S.S.E. Lemberg, capital of the circle, on the right bank of the Pruth, with a Roman Catholic church, a high school, and a trade in cattle. Pop. 22,867.

KOLOMNA, a town, Russia, in the government of and 60 miles south-east of Moscow, on the Kolomenka, a small affluent of the Moskwa, on a height. It is surrounded by brick walls of great height and thickness, and flanked with towers; is divided into two parts by the river, and tolerably well built, though most of the houses are only of wood. It is the see of a bishop, and the seat of several public offices, and has a cathedral, a monastery, a nunnery, a diocesan seminary, a superior school, manufactures of woollen, cotton, linen, &c., and an important trade in cattle, salt provisions, fish, hemp, hemp-oil, and hides. Pop. 18,808.

KOLYMA, a river, Siberia, in the government of Irkutsk, which rises in lat. 61° 30′ N.; lon. 146° E., in the mountains of Stanovoi-Krebet. After a course mainly N.N.E. it falls into the Polar Sea in lat. 69° 40′ N. The first 300 miles it is very rapid, but subsequently, as it widens, it becomes more tranquil. The right bank consists generally of steep bluff rocks of slate. The left bank is more flat, the whole country lowering gradually towards the sea till it becomes one enormous *tundra* or level moss. The chief tributaries are the Greater and Lesser Aniuj and the Omolon, which join the left bank not far from the sea. Afterwards the river divides into two, and subsequently into three branches, forming the embouchure, which is about 60 miles across. The Kolyma has sufficient depth for any vessel, but the navigation, especially at the entrance, is rendered dangerous by shifting sand-banks.

KOMORN, the capital of the county of Komorn, in Hungary, at the confluence of the Danube and Waag, with some manufactures and a considerable trade. There is here a fortress which is rendered almost impregnable by nature and art. Komorn was fortified by Matthias Corvinus in 1472, and again by Ferdinand I. in 1543. It was repeatedly besieged in the earlier European wars. It was unsuccessfully attempted by Napoleon in 1809. During the Hungarian insurrection of 1848–49 it was besieged by the Austrians in October, 1848, and surrendered to them 28th September, 1849. Pop. (1880), 13,108.

KONIA, or KONIEH (ancient *Iconium*), a town, Asiatic Turkey, pashalic of Karamania, in the centre of an extensive plain. With its Saracenic walls, flanked with towers 30 feet high, and from 2 to 3 miles in circuit, its appearance at a distance is very imposing, but its interior is a scene of desolation and ruin. The only inhabited portion is the centre, where the bazaars are situated. The most remarkable buildings are the ancient mosque Injemi Minareh Djami, adorned with exquisite tracery, fretwork, and mouldings; several handsome modern mosques, covered with glazed tiles and bricks of various hues, chiefly red and blue; and the old Turkish prison, with ruined towers, battlements, and keep, resembling a Gothic castle. The inhabitants are chiefly employed in making carpets, and in preparing leather, cotton, wool, and hides. Pop. above 40,000.

KÖNIGGRÄTZ, a town, Bohemia, capital of circle of same name, on the left bank of the Elbe, at the confluence of the Adler, 64 miles E.N.E. of Prague. It consists of the town proper and three suburbs, and is a place of great strength, being not only regularly fortified, but possessed of means of laying the surrounding country under water. It is the see of a bishop, and the seat of several important courts and public offices; contains an ancient cathedral, an episcopal palace, town-house, diocesan, seminary, with a library; a gymnasium, theatre, infirmary, hospitals, and barracks; and has manufactures of woollens, and several mills. The battle of Sadowa was fought in the vicinity on July 3, 1866. Pop. (1880), 8166.

KÖNIGINHOF, a town, Bohemia, circle and 14 miles N.N.W. of Königgrätz, on the Elbe; with a church, manufactures of woollen and linen cloth, and a tannery. Pop. (1880), 6813.

KÖNIGSBERG, a seaport town of Prussia, capital of the province of Prussia and of the government of the same name, on the Pregel, about 4 miles above where it enters the north-east extremity of the Frisches-Haff. It was once the Prussian capital and the residence of the electors of Brandenburg, and still ranks as the fourth city in the Prussian dominions. It is surrounded by walls and ramparts and detached forts. It consists of the town proper and of four suburbs. The former is divided into three parts—the *Altstadt*, or Old Town, situated on the west; *Löbenicht* on the east, and *Kneiphof*, situated on an island formed by the Pregel, which, before entering the town from the east, divides into two arms; the houses here being founded on piles, as at Venice and Amsterdam. The wall around the town and suburbs is 9 miles in extent. The Altstadt and Löbenicht are well situated on an elevated and rugged piece of ground. It is irregularly built, and in the old town the lower stories of the houses project like terraces, with flights of steps guarded by brass railings. The principal public buildings are the cathedral, an ancient and interesting Gothic structure, situated on the Kneiphof; the Haburger Kirche, a very conspicuous and handsome church; the Schloss, or palace, a large ugly building, now converted into a government house, but historically interesting as the residence of the grand-masters of the Teutonic order; the Schlosskirche, occupying a wing of the palace, and remarkable as the spot where Frederick, elector of Brandenburg, placed the crown on his own head when he became king of Prussia; the old citadel of Fredericksburg; the university, founded in 1554 by the Margrave Albert, and hence called the Albertine, attended by nearly 500 students, and having connected with it a library of 220,000 vols., a zoological museum, and other valuable collections; an observatory which the labours of Bessel have rendered

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famous, and a botanical garden, a gymnasium, an ecclesiastical seminary, and various other superior schools; two town-houses, a handsome exchange, a theatre, a lunatic asylum, an infirmary, and several hospitals and benevolent endowments. The manufactures are various, and include machinery, woollen, silk, and mixed silk goods, leather, sail-cloth, copper, steel, and ironware, needles, earthen and stone ware, liqueurs, and artificial mineral waters. There are also sugar and silver refineries, breweries and distilleries, and ship-building yards. Owing to a bar across the mouth of the Pregel the larger vessels bound for Königsberg land at Pillau, which is accordingly considered its port. The principal exports are grain, flax, hemp, oil-cake, bones, timber, &c.; the principal imports are colonial produce, iron, coal, cotton, cotton-twist, wine, spirits, and unrefined sugar. Königsberg is the seat of many important provincial courts and public offices. It was founded in 1255. In 1365 it became a member of the Hanse League; was the residence of the grand-master of the Teutonic knights from 1457–1528; in 1626 was surrounded with walls; in 1657 it received a strong additional defence in the citadel of Fredericksburg, though the object of the margrave who built it is said not to have been so much to defend the town as to overawe its citizens. It suffered much during the Seven Years' war by the occupation of the Russians from 1758 to 1764, and much more severely from the French, who entered it in 1807, after the battle of Friedland, and laid it under heavy contributions. It was visited by cholera in the summer of 1871. Pop. (1880), 140,909.

KÖNIGSBERG, a town of Prussia, province of Brandenburg, 41 miles north of Frankfort on the Oder, at the confluence of the Zerbst with the Röricke. It is walled, has several courts and public offices, two churches, a court-house, gymnasium, and hospital; manufactures of woollen and linen cloth, hats, and hosiery; a distillery, and a trade in cattle. Pop. (1880), 6568.

KÖNIGSHÜTTE, a town of Prussia, province of Silesia, 49 miles E.S.E. of Oppeln. The inhabitants are chiefly employed in mining, coal and iron being raised in large quantities, and also zinc. There are a number of blast, cupola, and puddling furnaces, rolling mills, &c., and the making of pig-iron, heavy castings, rails, and bar-iron is extensively carried on. The government coal mine of Königsgrube employs about 3000 workers. In 1864 Königshütte was only a village with 1164 inhabitants. The town was constituted in 1869 by the addition of surrounding districts. Pop. in (1880), 27,522.

KÖNIGSTEIN, a celebrated fortress on the Elbe, in the Kingdom of Saxony, in the circle of Dresden, and 17 miles south-east of the town of Dresden, not far from the frontier of Bohemia. It is situated on a mountain rising to the height of about 800 feet above the river, and enjoys the reputation of being almost the only European fortress which has never yet been taken. It is surrounded by a plateau several acres in extent, on which grain and forage can be raised for the maintenance of a besieged garrison. It is also provided with a well of excellent water, having a depth, according to some accounts, of upwards of 1000 feet. At the close of the Austro-Prussian war of 1866, Saxony, having sided with Austria, was compelled to allow this fortress to be occupied by a Prussian garrison, but after the Peace of 1871 the Prussian garrison was withdrawn, although the commander of the fortress, as of all other fortresses in the German Empire, is still appointed by the emperor. The Lilienstein is opposite. Pop. (including a small town at the base), 3788.

KÖNIGSWART, a town in Austria, in the Kingdom of Bohemia, and the circle of Eger, 4½ miles north-west of Marienbad. It has three mineral springs, one of which is chalybeate, and is used for drinking and bathing. The place is chiefly celebrated, however, for its palace, belonging to Prince Metternich. The old castle was destroyed by the Swedes during the Thirty Years' war, and the site was afterwards bought by the imperial general Count Metternich, who erected at the foot of the hill on which the ruins of the old castle stand a palace in the Italian style, which is surrounded with a park, and contains, in addition to a considerable library, rich collections of objects of nature and art, arms, antiquities, coins, &c., the bones of a number of saints, on account of which frequent pilgrimages are made to the place. These saintly relics are preserved in the altar of a richly-ornamented chapel attached to the palace. The altar, a present from Pope Gregory XVI., is hewn out of a single block of marble, and inlaid with the blue marble of which the pillars of St. Paul's church at Rome were made, but which has gradually disappeared since the total destruction of that building by fire. In the park there is an obelisk, erected in memory of the Emperor Francis I. Pop. 2112.

KONRAD. See CONRAD.

KOODOO (*Strepsiceros Koodoo*), a genus of antelopes found in North, South, and West Africa, and thus possessing a wide distribution over that continent. It is chiefly recognized by the beautifully regular spiral form of the horns, which in the adult are said to form so true a spiral, that a straight spear may be sent down through the whorls so as to touch the forehead of the animal. The males alone possess horns. The body is about 4 feet in length, and the height of the shoulder is about 3 feet. The body colour is a brownish-gray, striped across with white bars, which average from seven to nine in number, and extend from the back to the belly. The under surface of the body and the inside of the legs are white. A white mark of a V-shape is found on the forehead. The koodoo lives on grass and the soft leaves and other parts of trees. It is most active in the early morning and twilight, and is found solitary or in pairs.

KOOKAS, or KUKAS, a sect of fanatical Hindus in the Panjab, which originated after the annexation of that territory to British India (1849) in consequence of jealousy of the equal political rights which were granted to the Mohammedans of that region under British rule. They are a body of reformers of extreme views, and are hence regarded with as much hostility by orthodox Sikhs as they are by the Mohammedans, whose rights they are anxious to invade. The chief right conceded to the Mohammedans by the British government of India and objected to by the Kookas is that of killing cows, which are regarded as sacred animals in the Sikh religion; and it was mainly this practice that led to the consolidation of the most violent and fanatical adherents of the Sikh religion into a distinct sect. The first Guru or head of the sect was Baluk Ram, who belonged to a place near Attock, at the junction of the Cabul and the Indus. Baluk died about 1860, leaving the sect of the Kookas still weak in numbers and of little consequence; but under his successor, Ram Singh, a man of energy and of a combative spirit, a native of the Ludhiana district of Amballah, their numbers increased very largely, so as to reach probably at least 50,000, and according to their own account 800,000. Ludhiana became under Ram Singh the head-quarters of the sect, to which the leader gave a secret organization extending over the other districts of the Panjab, which were divided into sections under the care of soubahs, all of whom were again immediately subject to Ram Singh himself. In 1867 and in 1871 the proceedings of this sect were such as to call for the active inter-

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ference of the government. On the first occasion the danger was due to Ram Singh claiming the right to visit the sacred shrines of the Sikhs, which were only open to orthodox followers of that religion. Ram Singh led 10,000 of his followers to one of these shrines. A few constables had to be sent to meet them, but a conflict was happily avoided. In 1871 affairs did not take so fortunate a turn. The Kookas were in that year incited by their leader to attack and massacre the Mohammedan butchers who killed cows in different parts of the Panjab. They were, however, quickly suppressed by the British government. In an engagement in January, 1872, many of them were captured, and a number of the captives executed. Soon after the leader, Ram Singh, was apprehended and deported.

KOORIA MOORIA ISLANDS, a group of islands at the entrance of a bay of the same name on the south-eastern coast of Arabia. They are five in number. The largest of them is called Hellaniyah, and is the only one that is inhabited. The islands now belong to Britain, having been purchased to form a coaling station. There was a considerable deposit of guano on the largest island; but it was not of very good quality, and is now exhausted.

KORÂN (*Al-Korân*, that is *the Koran*, which means originally 'the reading, or that which is to be read;' also called *Forkan*, salvation; also *al Moshaf*, the volume; *al Kitab*, the book; *al Dhikr*, the recollection or reminder) is the religious code of the Mohammedans, written in Arabic by Mohammed. In size it is about equal to the New Testament. It is divided into 114 *surahs* or chapters, each of which begins with the phrase 'In the name of God.' Many of them have strange inscriptions, such as Congealed Blood, the Fig, the Star, the Towers, the Quaking Earth, &c. These surahs are again divided into *ayaths*. Another division is into thirty *ajza* and sixty *ahzâl*. The parts, originally thrown together miscellaneously into a box after they were written, were collected into a volume without any attempt at arrangement soon after Mohammed's death, at the command of Mohammed's father-in-law and successor Abu Bekr, by Zaid Ibn Thâbit. This form of the Koran contains all the various readings that had crept into the text, and in order to remove these Caliph Othman caused a new copy to be made from the original fragments in the thirtieth year of the Hejra (652 A.D.), and then ordered all the old copies to be destroyed. According to the Mohammedan doctrine, it was written from the beginning in golden rays on a gigantic tablet in heaven, and was communicated to the prophet on the night of Al-Khadr, in the sacred month of Rhamadân by the angel Gabriel precisely as it stands, verse for verse, chapter for chapter, written upon parchment made of the skin of the ram which Abraham sacrificed in the room of his son Isaac. The volume was ornamented with precious stones, gold, and silver, from Paradise. According to other traditions Mohammed is said to have drawn up the Koran with the assistance of a Persian Jew, Rabbi Warada Ibn Nawsal, and a Nestorian monk, the abbot of the convent of Addol Kaisi, at Bosra, in Syria; but nothing certain is known respecting these two persons, though it appears beyond a doubt, less from the author's doctrines than from the expressions (such as Gan Eden, the term he uses for Paradise; Gehinnom, equivalent to the Hebrew *Gehenna*, the name he uses for hell; Sabbath, the word he adopted for the day of rest, and so forth), his tales, and his mentioning several prophets, &c., that he was acquainted with the religions of the Jews and Christians. His knowledge appears to have been derived, however, more from oral intercourse with adherents of these creeds than from an extensive acquaintance with their sacred books. Of the sacred writings of the Jews he cites only the Pentateuch and the Psalms. In the twenty-first chapter he represents the Almighty as saying, 'I have promised in the books of Moses and in the Psalms that my virtuous servants on earth shall have the earth for their inheritance.' Of the New Testament he cites nothing whatever. Not only was he acquainted with the religious systems of the Jews and Christians, but also with those of the Sabæans and Magians, from all of which he seems to have drawn materials which he incorporated into a system, after the idea of establishing a religion in his country, where numberless sects of Pagans, Jews, Christians, Sabæans, and Magians existed, had risen in his mind. He lived, as is well known, much in solitude, where he doubtless meditated on his doctrine, and the great mission which he thought himself called upon to accomplish. He does not reject the doctrines of any sect, but takes from all. He asserts that he wishes to restore the true faith to its purity. The unity of God is his fundamental doctrine, which is clearly laid down in the symbol of the Moslem—'God is God, and Mohammed is his prophet.' The unity of God is the very aim of his mission, and according to him had been the essence and the basis of all true religion, with which ceremonies and customs were only accidentally connected. Thus he says in the eleventh chapter of the Koran, 'We make no difference between that which God has taught us and that which Abraham, Isaac, Ishmael, the twelve tribes, Moses, and Jesus have learned from the Lord. We believe in God, and are Moslem.' And in the fourth chapter it is said, 'God commands thee to receive the religion which he prescribed to Noah, which he has revealed unto thee, and which he imparted to Abraham, Moses, and Jesus.' To Christ he assigns a place in the seventh or highest heaven, in the immediate presence of God. Besides the fundamental doctrine of the unity of God, the Koran establishes several other articles of faith. Thus, in chapters four, six, seven, and forty-eight, the doctrine of good and bad angels is set forth, which was general with the Arabians before Mohammed. Mohammed returns most frequently to the doctrine of the resurrection and the last judgment. The way in which he endeavours to set it forth has much similarity with that of St. Paul. He even borrows expressions from the Jewish and Christian scriptures when he speaks of the last judgment. In chapter forty-three it is said, 'When the trumpet sounds the second time they shall rise quickly from the graves to appear before God;' and further, 'A sound of the trumpet of judgment will assemble all men before my throne, and every one shall there receive the reward of his deeds.' In regard to the form of the last judgment Mohammed followed the doctrines of the Jews and Magians; for instance, the passage of the narrow bridge Al-Sirat, the book in which all the actions of men are set down, and the scale in which they are weighed. Mohammed's paradise, too, is quite Jewish and Magian. Another dogma is set forth in the Koran, yet not explicitly, that of the unchangeable decrees of God. Mohammed used the doctrine of predestination with great success to infuse into his adherents undaunted courage, which elevated them above all perils. Probably he adopted in this case views already widely spread. With the Sabæans the belief in predestination was firmly established, and founded on the unchangeable course of the stars, and their influence upon the life and actions of men and the course of events. With the Magians this doctrine followed from their system of the good and evil principles, and probably it had passed from both to the Arabians. In regard to religious exercises, too, Mohammed adopted such as he found, giving more universality and precision to those

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which were vague. The Koran prescribes prayer, fasting, alms, and the pilgrimage to Mecca. The first includes everything relating to the purifications and ablutions by which the faithful prepares himself for prayer. Mohammed considered this exercise of the greatest importance. When the Tayesites sent an embassy to the prophet to request him to absolve them from the troublesome observance of this exercise his answer was, 'Religion is nothing without prayer.' In another passage he calls prayer the 'key to paradise.' He surpassed the severity of the rabbis, and prescribed prayer five times a day with the face turned towards Mecca. Turning the face during prayer towards a certain point is a common custom with the orientals. It was particularly so with the Jews, Sabæans, and Magians, who call the point to which they turn *kibla*. In the beginning Mohammed adopted the same *kibla* with the Jews, that is, the city of Jerusalem. In the second year he changed the *kibla* to Mecca. To give alms was always a particular trait of the Arabians, but Mohammed made it obligatory. The pilgrimage or something similar had existed with most sects before him. In respect to the civil laws relating to polygamy, divorce, inheritance, &c., Mohammed followed step for step the laws of Moses and the decisions of the rabbis, only adapting them to the customs and prejudices of his countrymen. Excepting the worship of idols, which was positively against his fundamental doctrines, he attacks few old customs; and though he prohibits the use of inebriating liquors, and requires fasting, yet he says, 'God intended that his religion should be easy, else, as he well knew, you would only become hypocrites'—a sentiment probably caused by the state of the Christian and Jewish sects with which he was acquainted. The Koran is written in prose, but the different parts of a sentence end in rhymes. As the work was written at different times, in different moods, and on different occasions, there is naturally great diversity in the style of different passages. While the earliest passages are frequently characterized by outbursts of a wild, unbridled fancy, such as in some measure to justify the sneers which the people of Mecca cast upon Mohammed as a poet, prophet, and possessed person, the later passages exhibit greater calmness and a more subdued imagination. The most elevated portions are those which speak of the greatness of God, and those which describe the scenes of the last judgment, the pleasures of paradise, and the pains of hell, although the latter especially are often offensive to a European taste owing to the excess of hyperbole. The language of the Koran is considered the purest Arabic, and contains such charms of style and poetic beauties that it remains inimitable. Its moral precepts are pure. A man who should observe them strictly would lead a virtuous life. It inculcates obedience to God, charity, mildness, abstinence from spirituous liquors, and toleration, and ascribes particular merit to death in the cause of religion. 'From the Atlantic to the Ganges,' says Gibbon, 'the Koran is acknowledged as the fundamental code, not only of theology, but of civil and criminal jurisprudence; and the laws which regulate the actions and the property of mankind are guarded by the infallible and immutable sanction of the will of God.' The divinity and authority of the Koran were contested, as early as 740 A.D., under the caliphate of Hescham by Djeab Ibn Dirhem. This heresy was checked by the execution of its author, but it reappeared about seventy years later, and was finally subdued only when Harun II., in 842, prohibited the nature of the Koran from being discussed. The Koran is now regarded with great reverence in Mohammedan countries. It is daily read once through in the mosques of the sultan and the adjoining chapels. Mohammedans never touch it without previous purification, and never carry it below the girdle. Texts taken from it are frequently written on doors, walls of rooms, banners, &c. The commentaries upon it are exceedingly numerous. The library of Tripoli, in Syria, is said to have contained no less than 20,000. The most celebrated are those of Samachshari (belonging to the sixth century of the Hejra), Beidhavi (eighth century), Mahalli (ninth century), and Soyuti (ninth century). That of Beidhavi was edited by Fleischer and published at Leipzig in two vols. (1844–48). The Koran is said to have been printed in the Arabic text about the year 1530 by Paganini of Venice, but no copy of this edition, if there ever was such, has come down to us. The whole impression is said to have been destroyed at the command of the pope. The earliest edition of the Koran at present known is by Abr. Hinkelmann (Hamburg, 1694, 4to); another, with a good Latin translation by Maracci (Padua, 1698, fol.); a fine edition, now very rare, was published by order of Catharine II. by Mollah Usman Ismael (Petersburg, 1787, small folio; new edition, 1790 and 1793; reprinted, Kasan, 1809, fol.); another edition appeared at Kasan in large 4to in 1803, and several have been published at Calcutta, Teheran, and other places in India and Persia, with Indian and Persian translations and commentaries, but these last editions are of small critical value. Another European edition, prepared by Flügel, was published at Leipzig (third edition, 1858). Besides the Latin translation already mentioned, by Maracci, the chief translations of the Koran are those of Sale (1734) and Rodwell (1862) into English, of Wahl (Halle, 1828) and Ullmann (fifth edition, Bielefeld, 1865) into German, and Kasimirski (Paris, 1840) into French. A translation into Italian, published at Venice in 1547, is necessarily inexact, having been made from a bad Latin version by Robertus Retenensis. A *vocabularium* or concordance of the Koran was published by Willimet and Foorkan (Calcutta, 1811, 4to), and another work of the same nature by Flügel at Leipzig in 1842. On the subject of the Koran consult besides Weil's Historisch-kritische Einleitung in den Koran (Bielefeld, 1844), Muir's Life of Mohammed and History of Islam to the Era of the Hegira (London, 1858), and Nöldeke's Geschichte des Korans (Göttingen, 1863).

KORDOFAN, a country in East Africa, between lat. 12° 30′ and 15° 30′ N.; lon. 29° 20′ and 31° 30′ E.; and bounded west by Senaar, and east by the country of Beni Fezarah tribes, separating it from Darfur. The surface is generally flat and the soil naturally fertile. In the dry season vegetation appears almost extinct, but with the rainy season springs up as if by magic, clothing the ground with flowers and filling the air with balsamic odours. The climate in the wet season, lasting from June to October, is extremely unhealthy; in the dry season, though healthy, is intolerably hot; at this time frightful hurricanes occur. The principal articles of export are gum, hides, and senna leaves, all monopolized by the government as most lucrative; ivory, cattle, tamarinds, ostrich eggs and feathers, gold, salt, slaves, &c.; the imports spices, sugar, coffee, sulphur, rice, soap, cotton and linen cloth, &c. Cultivation is almost wholly confined to duchn, a species of grain resembling millet, but with a stalk 7 or 8 feet high. The inhabitants consist of negroes, considered aborigines; Arabs, and emigrants from Dongola, the last of whom are the most opulent section of the population. They are now subject to the Viceroy of Egypt, the country having been subdued by Mehemet Ali. It forms one of the six governments established by Egypt under the general denomination of Belad-el-Soudan (country of the blacks). Pop. estimated at 400,000.

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KÖRNER, THEODOR, a German poet, particularly celebrated for the spirited poems which he composed in the campaign of 1813 against Napoleon, in which he fell. He was born at Dresden September 23, 1791. His father often received Schiller and Goethe in his house at Dresden. Körner first studied mining at Freiburg. In 1810 he went to the University of Leipzig, where his ardent temperament led him into acts of imprudence, which obliged him to leave Leipzig. He went to Vienna, where he brought out several short dramatic pieces (Der grüne Domino, Die Braut, Die Gouvernante, &c.), composed in the best comic vein, besides some longer dramas of a more serious character, the most celebrated of which is the tragedy of Zriny. In 1813, when all Germany took up arms against Napoleon, Körner served in the corps of Lützow, a Prussian officer. In the battle of Kitzen he was severely wounded in the head, but recovered during the armistice, on the expiration of which he again took the field. On the 26th of August, 1813, he was fatally wounded in a trifling skirmish which was fought in the neighbourhood of Gadebusch, in Mecklenburg-Schwerin. An hour before he had finished his famous song, the Address to his Sword, and read it to his comrades. An iron monument shows the place where he rests under an oak-tree, near the village of Wöbbelin, in Mecklenburg. His father published thirty-two of his war-songs under the title Leier und Schwert —Lyre and Sword (Berlin, tenth edition, 1863). Many of these poems have been set to music by Weber, and, taken as a whole, they are unique. They have all become national in Germany. Körner's father also published his other works.

KÖRÖS, NAGY, a market town in Hungary, in the comitat of Pesth, and 47 miles south-east of the town of Pesth, in a fertile but somewhat marshy district. It contains a number of handsome buildings; and has a considerable trade in wool and cattle. Pop. (1880), 22,769.

KOSCIUSKO, THADDEUS, the last generalissimo of the Republic of Poland, one of the noblest men of his time, was born in Lithuania of an ancient and noble though not a wealthy family in 1746, and died at Soleure (Solothurn), October 15, 1817. He was educated in the military school at Warsaw, and was afterwards sent at the expense of the state in the capacity of sub-lieutenant to complete his studies in France. On his return to Poland he became tutor to the daughter of Gosnovski, marshal of Lithuania, but having conceived a passion for his pupil, and being disappointed in his suit, he quitted his native country and betook himself to America (1777), where the English colonies were then engaged in the war of independence. Being an ardent lover of freedom he offered his assistance to the rebels, and having attracted by his courage the notice of Washington was appointed by him engineer, with the rank of colonel, and afterwards general of brigade. He did not return to Europe till three years after the conclusion of the Peace of 1783. For some years after his return he lived in retirement. On the occasion of the reorganization of the Polish army in 1789 he was appointed major-general, and having declared for the constitution of the 3d of May, 1791, he fought in the war which soon after broke out under Prince Jos. Poniatovski with the rank of lieutenant-general. At Dubienka, in July, 1792, he laid the foundation of his military fame by his obstinate defence of his camp during five days against a Russian force four times as numerous as his own. When Stanislaus Augustus in 1793 agreed to the second partition of Poland Kosciusko withdrew from the army and retired to Leipzig. At this time the legislative assembly in France conferred on him the title of French citizen. When a new insurrection broke out in Poland for the purpose of delivering the country from the Russians in 1794 Kosciusko was recalled and made commander-in-chief of the insurgent army. He defeated the Russians at Raclavice, near Cracow, but at the battle of Maciejovice his army was defeated and he himself wounded and taken prisoner. He remained in captivity for two years, but was liberated on the accession of Paul I. of Russia in 1796. He then proceeded to England, and thence to America. In 1798 he returned to Europe on a mission from the American Congress to France, and contributed to bring about an understanding between the latter country and the United States. He lived in privacy either at Paris or in a country house near Fontainebleau till 1814. For a short period in that year he resided at Vienna during the session of the congress held there. On the 9th of April, 1814, he addressed a petition to Alexander I., emperor of Russia, requesting him to grant an amnesty to all expatriated Poles, to accept the title of King of Poland, and to give that country a free constitution similar to that of England, but the petition remained without effect. In 1815 he travelled over Italy in company with Lord Stewart, and then settled at Soleure in Switzerland, where he continued to live in quiet retirement. In April, 1817, he issued from here a letter of emancipation to the serfs on his estate of Siechnovice in Poland. His death was occasioned by his horse falling over a precipice. In 1818 his body was removed at the expense of the Emperor Alexander of Russia to Cracow, where it was buried in the cathedral, and where a monument was erected to him.

KOSEL, a town in Prussia, in the province of Silesia, in the government of Oppeln and 24 miles S.S.E. of the town of Oppeln, capital of the circle of the same name, on the left bank of the Oder, here crossed by a bridge, and on the Upper Silesian Railway. It is surrounded by walls, and otherwise fortified; has several courts and public offices, a hospital, barracks, and tile-works. Pop. (1880), 5030.

KÖSLIN, or CÖSLIN, a town in Prussia, in the province of Pomerania, capital of the government of the same name, on a low plain at the foot of the Gollenberg, 4 miles from the Baltic, and 85 miles north-east of Stettin. It is built with great regularity, entered by three gates, and has an old castle, a gymnasium, three hospitals, and a monument in the market-place to Frederick William I. On the neighbouring hill called Gollenberg there is a cross erected in memory of those belonging to East Pomerania who fell in the wars of 1812–15. The manufactures of Köslin consist of woollen, linen, and silk goods, hosiery, soap, and tobacco. Pop. in 1880, 16,834.—The government, bounded north by the Baltic, east by Dantzig and Marienwerder, south by Marienwerder and Frankfurt, and west by Stettin, has an area of 5420 square miles. The surface, except toward the coast, where low sand-hills occur, is a dead flat, watered by numerous lakes and streams; the soil, though sandy, is tolerably fertile, and raises good crops of corn. Much of it is devoted to pasture, and there are several extensive forests, chiefly of pine. There are few manufactures. Pop. in 1880, 586,115.

KOSLOV, a town in Russia, in the government of Tambov and 52 miles W.S.W. of the town of Tambov, on the Lesnoi-Voronej. It has a considerable trade in cattle, hides, and salt provisions, several important annual fairs, and some large manufactories, especially for the making of tallow. Koslov has nine churches, a school for the circle, and several benevolent societies. Pop. 25,522. For another Koslov or Kosloff, see EUPATARIA.

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KOSMOS, more generally though less properly written *Cosmos*, is a Greek word, the primary signification of which is 'order,' and which afterwards came to be applied to the *world* or *universe* on account of the beauty and order displayed in it, and in this latter sense it has been adopted by Alexander von Humboldt as the title of his celebrated work which describes the nature of the starry firmament as well of the elementary and organic beings existing on the surface of the globe. Cosmography is a description of the universe, in contradistinction to geography, or a description merely of the earth, and *cosmical relations* are those which concern nature considered as one great and general whole, including the solar system as well as the universal agencies of gravity, light, magnetism, and electricity, in opposition to *tellurian relations*, strictly so called, which do not extend beyond the sphere of the terrestrial globe, for example, climate, weather, stratification of the ground, &c. As to the various theories of the universe, both ancient and modern, see COSMOGONY, which is the term now generally applied to theories of this nature.

KOSTROMA, a government of Russia, bounded N. and N.W. by Vologda, W. by Jaroslav, S. by Vladimir and Nijnei-Novgorod, and E. and S.E. by Viatka; it has an area of 30,863 square miles. The surface consists of wide level plains, occasionally varied by gentle acclivities. The soil in the north is cold and swampy, and in the south consists of clay, loam, and sand, only of moderate fertility. Two of the most important crops are hemp and flax, much of which is spun on the spot, and manufactured, giving employment to a large population both in town and country. The forests are extensive, and a good deal of bog iron is smelted in small furnaces. After table and ordinary linen the most important branch of industry is the preparation of Russia leather. Pop. 1,251,718.

KOSTROMA, a town in Russia, capital of the government of the same name, on a height near the confluence of the Kostroma with the left bank of the Volga, 56 miles east of Jaroslav. It is an ancient place, surrounded by an earthen rampart which has been formed into a promenade, and has numerous churches, government buildings, an ecclesiastical college, and a gymnasium. Its manufactures of Russia leather have long been celebrated. Pop. 30,405.

KOSTROMAS, THE, the name given by the English to two Russians who exhibited themselves in Britain 1873–74. Their names were Andria and Feodor, father and son, the latter a mere child. Both had their faces covered more or less with hair. In the case of the man the hair overspread the face —the child had only a few tufts of a downy, light-tinted kind of hair. Besides their strange appearance they exhibited another abnormality, namely, in the rudimentary condition of the teeth. The story which was given to the public relative to them, was that they were found by a party of hunters in a forest of the province of Kostroma in a perfectly savage state. The man was at first unable to express himself in Russian, although he afterwards mastered sufficient of the language to converse with his attendant. The boy, apart from his strange appearance, was not by any means repulsive, and appeared quick of apprehension.

KÖTHEN. See COETHEN.

KOTTBUS, a town in Prussia, in the province of Brandenburg and the government of Frankfurt, capital of the circle of the same name, on the left bank of the Spree, 65 miles S.E. of Berlin. It is a busy manufacturing town. The chief manufactures are woollen cloth and yarns, linen, hosiery, tobaccos, toys, and carpets. There are also distilleries and breweries. Pop. (1880), 25,584.

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON, a prolific German writer, was born May 3, 1761, at Weimar. At the age of sixteen years he entered the University of Jena, where his inclination for the drama, already awakened at Weimar by the celebrated company of players in that city, was confirmed by his connection with a private theatre. The marriage of his sister to a gentleman of Duisburg induced him to enter the university, then at that place; but in 1779 he returned to Jena, and studied law, without, however, ceasing to compose for the theatre. On leaving the university he was admitted a lawyer. In 1781 he went to St. Petersburg, at the suggestion of the Prussian minister at that court, and became secretary to the governor-general, Von Bawr, who died two years afterwards. He had, however, recommended Kotzebue to the empress, and she became his patroness. He was finally appointed president of the government of Esthonia, and, as such, was ennobled; in consequence of which he wrote his work On Nobility, in which he defended this institution, after having often attacked it as a poet. In 1790, on a journey to Pyrmont, he published his notorious Doctor Bahrdt with the Iron Forehead, under the name of Knigge, by which he sank greatly in public esteem. In 1795 he retired to a country place about 35 miles from Narva, in Esthonia, but soon after removed to Weimar, with a pension, and again returned to St. Petersburg, where his sons were educated in the imperial military school. Although he had a passport, yet on his arrival at the frontiers he was arrested, and sent to Siberia, without learning the reason. A small drama of his, an indirect eulogy of Paul I., was translated into Russian, and laid in manuscript before the emperor, who was so delighted with it that he recalled Kotzebue, and took him into favour. After the death of this emperor he again went to Germany. In 1802 he was chosen member of the Academy of Sciences of Berlin—by what intrigues we do not know—and with Merkel formed a party against Goethe and Schlegel, in which contest the latter, of course, were much superior. In 1806 he went again to Russia, to avoid the French, and lived from 1807 on his estate Schwartze, in Esthonia, never ceasing to write against Napoleon. In 1813, as counsellor of state, he followed the Russian head-quarters, constantly writing to excite the nations against Napoleon, and published in Berlin the Russo-German National Gazette (Volksblatt). In 1814 he produced a very one-sided history of the German Empire. He had already proved himself totally unfit for the office of an historian by his Early History of Prussia (Riga, 1808-9). In 1817 he received a salary of 15,000 roubles, with directions to reside in Germany, and to report upon literature and public opinion. Kotzebue, who during the whole campaign had written in favour of the Russians, even at the expense of his native country, was now considered by most Germans as a spy. He established the Literary Weekly Paper (Literarisches Wochenblatt), in which he criticized the publications of the day, and advanced political opinions equally dishonourable to himself and obnoxious to Germany, ridiculing every attempt at liberal institutions. The state of things before the French revolution was his standard of perfection. Kotzebue was hence regarded with aversion by the liberal party in Germany, as an enemy to the freedom of his country; and among the young and ardent his ridicule of their noblest sentiments and most cherished hopes awakened bitter hatred. This feeling was so strong in the case of a young enthusiast named Sand, that he formed the plan of putting Kotzebue to death, as the enemy of his country, and deliberately murdered him, March 23, 1819, after which he immediately gave himself up to justice. The best productions of Kotzebue are

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his comedies, which seem to be much more popular with foreigners than with Germans. A sickly sentimentality in his graver dramas, and the insipidity of his comedies, are seldom redeemed by higher excellences. He wrote ninety-eight dramas. A collection of them in forty vols. was published at Leipzig in 1840–41. As an historian he deserves to be mentioned only for a few documents reprinted in his Prussian History.

KOTZEBUE, Otto von, a famous Russian navigator, the second son of the preceding, was born at Reval in 1787, and educated in the cadet school at St. Petersburg. In his seventeenth year he accompanied Krusenstern in his voyage round the world. He returned in 1806, and nine years after was appointed to the command of the ship *Rurik*, destined to ascertain the practicability of a north-east passage in the direction of Behring's Strait. He was accompanied, among others, by Chamisso, Eschscholtz, and Choris. He sailed from Cronstadt in 1815, discovered several groups of islands in the Pacific, and a large sound on the south-east of Behring's Strait, which now bears his name; and returned after a three years' absence. The results of the voyage were published in a work called A Voyage of Discovery in the South Sea and to Behring's Strait in Search of a North-east Passage (St. Petersburg, three vols., 1821–23). In 1823 he was commissioned by the Emperor Alexander to make a third voyage round the world. He was accompanied by Eschscholtz on this occasion also, and returned in 1826, publishing the results of the voyage as before, in a work which has been of great importance to hydrography, particularly that of the Pacific. He died at Reval in 1846.

KOUMISS, a preparation of milk, whether cow's, mare's, ass's, or goat's, which is said to possess wonderful nutritive and assimilable properties, so that it is very valuable in the treatment of consumption, scrofula, chronic diarrhœa, and debility and emaciation in general. It consists essentially of milk in process of fermentation, and cow's milk is what is used for making it in this country. On the Asiatic Steppes, where it has been long used as a beverage, it is made of mare's milk, but koumiss of mare's milk or goat's milk has a somewhat unpleasant smell. Writing in the British Medical Journal of Jan. 10, 1874, Dr. Jagielski, who first introduced koumiss into this country, remarks that 'there can be no doubt that koumiss will one day occupy a position in every materia medica compared with which that of cod-liver oil, stout, beef extract, revalenta, &c., will be quite secondary.'

KOURSK. See Kursk.

KOVNO, a town in Russian Poland, in the government of the same name, of which it is the capital, 52 miles W.N.W. Vilna, on the left bank of the Niemen or Memel. It has a considerable trade in corn, and some linen-weaving. The mead made here is famed. From the 23d to the 25th of June, 1812, the main body of Napoleon's army here crossed the Niemen into Russia, and on the 14th of Dec. in the same year Ney led a vanguard of 200 men back across the river at the same spot. A cast-iron pyramid in the town commemorates the deliverance of Russia on this occasion. About 6 or 7 miles from the town there stands, in a wood on the banks of the Vilia, the splendid Camaldulensian monastery of Posayscie, built in 1674 by Christopher Paz, grand-chancellor of Lithuania. The population of Kovno, a great part of which consists of Jews, is 42,227.—The government of Kovno was formed in 1843, chiefly out of the northern districts of the Lithuanian government of Vilna. It is bounded N. by Courland, E. by Vilna, S. by Poland and Prussia, and W. by Prussia and the Baltic. Its area is 15,602 square miles, and its population 1,403,079. It corresponds to the ancient Samogitia. More than half of the inhabitants are Lithuanians and Samogitians; the rest are chiefly Poles, Germans, Jews, and gipsies. There are few Russians. Flax-fields and magnificent woods occupy a large part of the area. The timber is chiefly floated down the Niemen and its tributaries to Tilsit. The government is divided into seven circles.

KOWLOON. See Cowloon.

KRAJOVA, a town in Rumania, situated near the Sibyl, capital of the Walachian administrative district of Dolshi, in Little Walachia. It has an active trade, particularly in salt from mines in the vicinity. Pop. 25,000.

KRAKEN, Kraxen, or Kraben, the term, of Norwegian origin, applied to a fabulous sea-monster, generally assumed to be a gigantic Cephalopod or cuttle-fish. Although the existence of so-called 'sea-monsters' has very naturally been doubted by men of science, who are reasonably chary of accepting any but trustworthy evidence, yet recent researches and discoveries would seem to indicate that very large members of the cuttle-fish group do certainly exist, and that, from analogy, largely-developed forms of other marine classes may occasionally be found. It may be therefore useful and interesting to note in the present instance a few of the more celebrated cases, legendary or exaggerated, and real or certified, in which the occurrence of such monsters has been stated and asserted. The learned Pontopiddan, bishop of Bergen in Norway, gives a long account of the kraken, otherwise called *horren*, *sø-horren*, *ancker-troll*, and *kreuz-fisch*, which, according to the good bishop, is 'incontestably the largest sea-monster in the world. It is round, flat, and full of branches. The Norwegian fishermen unanimously affirm, and without the least variation in their accounts, that when they row out several miles to sea, particularly in the hot summer days, and by their situation (which they know by taking a view of certain points of land) expect to find 80 or 100 fathoms water, it often happens that they do not find above 20 or 30, and sometimes less. At these places they generally find the greatest number of fish, especially cod and ling. Their lines, they say, are no sooner out than they may draw them up with the hooks all full of fish; by this they judge that the kraken is at the bottom. They say this creature causes these unnatural shallows mentioned above, and prevents their sounding. These the fishermen are always glad to find, looking upon them as a means of their taking abundance of fish. There are sometimes twenty boats or more got together, throwing out their lines at a moderate distance from each other, and the only thing they have to observe is whether the depth continues the same (which they know by their lines), or whether it grows shallower, by their seeming to have less water. If this last be the case, they find then the kraken is raising himself nearer the surface, and then it is no time for them to stay any longer; they immediately leave off fishing, take to their oars, and get away as fast as they can. When they have reached the usual depth of the place, and find themselves out of danger, they lie upon their oars, and in a few minutes after, they see this enormous monster come up to the surface of the water. He there shows himself sufficiently, though his whole body does not appear, which in all likelihood no human eye ever beheld, excepting in the case of one of the young of this species, which shall afterwards be spoken of. Its back or upper part, which seems to be in appearance about 1½ English mile in circumference—some say more, but I choose the least for greater certainty—looks at first like a number of small islands surrounded with something that floats

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and fluctuates like sea-weed. Here and there a large rising is observed like sand-banks, on which various kinds of small fishes are seen continually leaping about, till they roll off into the water from the sides of it. At last several bright points or horns appear, which grow thicker and thicker the higher they rise above the surface of the water, and sometimes they stand up as high and large as the masts of middle-sized vessels. It seems these are the creature's arms, and it is said if they were to lay hold of the largest man-of-war they would pull it down to the bottom. After this monster has been on the surface of the water a short time it begins slowly to sink again, and then the danger is as great as before, because the motion of his sinking causes such a swell in the sea, and such an eddy or whirlpool, that it draws everything down with it.' The arms above described are conjectured to be tentacula, and the kraken itself thus to be an enormous polypus or cuttle-fish. Pontoppidan further continues: 'As we can hardly expect an opportunity to examine this most enormous sea-animal alive, I am the more concerned that nobody embraced that opportunity which, according to the following account, once did, and perhaps never more may offer, of seeing it entire when dead. The Rev. M. Friis, consistorial assessor, minister of Bodoen in Nordland, and vicar of the college for promoting Christian knowledge, gave me, at the latter end of last year, when he was at Bergen, this relation, which I deliver again on his credit: In the year 1680 a kraken, perhaps a young and careless one, came into the water that runs between the rocks and cliffs in the parish of Alstahoug, though the general custom of that creature is to keep always several leagues from land, and therefore of course they must die there. It happened that its extended long arms or antennæ, which this creature seems to use like the snail in turning about, caught hold of some trees standing near the water, which might easily have been torn up by the roots; but besides this, as it was found afterwards, he entangled himself in some openings or clefts in the rock, and therein stuck so fast, and hung so unfortunately, that he could not work himself out, but perished and putrefied on the spot. The carcass, which was a long while decaying, and filled great part of the narrow channel, made it almost impassable by its intolerable stench.' Such was the Bishop of Bergen's account of the krakens of his day.

Assuming that by the kraken Bishop Pontopiddan really means a cuttle-fish of large size, we may remark, before passing to note several other accounts of similar occurrences, that Pliny and Aristotle have each had their say regarding the reputed monsters of their age. Pliny the Elder tells us of a gigantic Cephalopod that for long devastated the fishing-grounds on the Spanish coast, and which when taken weighed 700 lbs., its arms being each 30 feet in length. The head, Pliny tells us, also weighed 700 lbs. Aristotle speaks of a cuttle-fish 30 feet in length. During the Renaissance, when the fabulous in science assumed the place of the veritable and true, Denis de Montfort and Olaüs Magnus reproduced and added to the creations and legends of their predecessors. Under the hands of the first-mentioned worthy the kraken assumed formidable dimensions. It was represented as wrecking ships of large size by the strength of its arms, as creating whirlpools and mäelströms by the action of its swimming-powers, and as being, in short, the realization of all that was prodigious and strange in size, habits, and appearance. And to the foregoing accounts we may add the adventure of one Dens, a northern navigator, hailing from about the middle of the sixteenth century, who relates that when in mid-ocean he fell in with a gigantic poulpe or cuttle-fish which slowly rose from the depths of the sea, and proceeded relentlessly to demolish Dens' ship. Terrified by the appearance of the monster, many of the crew took leave of the vessel, but Dens succeeded in rallying the braver portion of his men, and by aid of hatchets and prayers to St. Thomas, their tutelary saint, also succeeded in releasing his ship from the arms of the monster, which then disappeared in the deep. In gratitude for his deliverance Dens ordered a picture of the event to be painted, which he deposited in the chapel of St. Thomas at St. Malo in France.

Such are a few of the many accounts of encounters with reputed sea-monsters, of which the so-called kraken is held the chief. And before noting the more modern and verified versions of such incidents, it may be well to remark on the slight degree of importance which can be attached to such tales. Coming as they do from a period when the fabulous was greatly in vogue, and from men who, whether naturalists or not, were not much given to verifying the accounts they had been furnished with, we must naturally hesitate, before according to these accounts even a small measure of belief. And when in addition, we consider that the tales have in many cases been furnished us by 'yarn-spinning' sailors and adventurers, the small measure of belief must diminish into an assertion of absolute incredulity. Bearing such necessary cautions fully in mind, we may yet find in more recent accounts some very interesting particulars with regard to gigantic cuttle-fishes—the modern representatives of the old kraken—and also with regard to the appearances of reputed sea-monsters, belonging apparently to types of animal structure other than that of the cuttle-fishes. In Captain Cook's first voyage the remains of a cuttle-fish, of relatively large size when compared with ordinary forms, were found floating between Cape Horn and the Polynesian Islands. Portions of this specimen are preserved in the Hunterian collection of the Royal College of Surgeons of London, and from the size of the fragments it has been calculated that the entire length of the body, including the tentacles, was about 6 feet. In the Atlantic Ocean remains of a cuttle-fish were met with by Quoy and Gaimard, the total weight of which was estimated at 200 lbs. Péron fell in with a cuttle-fish 8 feet long in the Australian Seas; and in 1853 a large Cephalopod was stranded on the coast of Jutland, the carcass of which made several wheel-barrow loads, being cut up for bait by the fishermen. The buccal mass, including the upper part of the throat and jaws, was as large as an infant's head. Steenstrup of Copenhagen described this specimen, and gave it the name of *Architeuthis dux*. Other specimens and their remains, from the same or neighbouring localities, have also been described, the tentacles of one form being as thick as a human thigh. In these accounts it will be observed the actual size of the creatures is for the most part *estimated*, or calculated from the relative proportions of various fragments, and not from actual or direct measurement. Hence in all such cases—and the remark applies to succeeding examples also—the stated size must be held subject to objection or modification, generally to the side of reduction, and rarely to that of increase. In 1861 a gigantic cuttle-fish belonging to the Calamary genus was discovered by the French corvette *Alecton*. The following account, taken from the Comptes Rendus of 30th December, 1861, gives the main details of the case:—'On the 30th November, 1861, the French steamer *Alecton*, being then about 40 leagues north-east of Teneriffe, fell in with a gigantic cuttle-fish of a brick-red colour disporting himself at the surface of

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the sea. He was hit by several bullets, and at last struck with a harpoon, and seized by a cord with a slip-knot. At this moment, however, when every preparation was being made to secure it, the animal by a violent effort tore away the harpoon from its soft flesh, and at the same time the noose slipped down to its caudal end, where it held; but in hoisting the creature out of the water the part thus seized broke off, and only a fragment weighing about 46 lbs. was brought on board. Both sailors and officers were anxious to have a boat lowered in order to go in pursuit of the creature; but the captain, fearing that some harm might happen to the boat's crew in their struggle with so novel an opponent, declined, and left the mutilated cuttle-fish to its fate. The ship was brought sufficiently near to enable one of the officers to make a drawing of it. Its length was 15 or 18 feet, and its eight arms, covered with suckers, were estimated at 5 or 6 feet long; its beak measured about 1½ foot across, and its weight was estimated at 2000 kilogrammes (above 4000 lbs.)' Such is the circumstantial account given of the encounter with this gigantic squid. There are, however, one or two points in the narrative which would require further explanation to render the account thoroughly satisfactory. Thus the Calamaries have ten arms, two being longer than the rest; whilst this large specimen—a Calamary according to the account and sketch—possessed only eight equal arms. Where were the two elongated tentacles? Then, as a French *savant* has well observed, the ink-secretion of the cuttle-fish should have been poured out in abundance on this occasion, when the creature was harassed even to the extent of losing its tail. Yet we find no mention made of any such defensive display. These are the objections of a naturalist, it is true, and do not affect in the main the recital of the actual occurrence; but in such cases, as already remarked, we are entitled to have accurate and thoroughly reliable evidence before assenting to the accounts of any such strange phenomena. In some cases such evidence has been obtained in recent times, as in the case of a gigantic cuttle-fish which was encountered by two fishermen in October, 1873, in Conception Bay, Newfoundland, one of the arms of which was cut off and secured. As related by the Rev. Moses Harvey of St. John's, the two fishermen were out in a small punt when they saw something in the water that they took for a large sail or the débris of a wreck. One of them struck it with his gaff, when it reared a parrot-like beak, and gave the boat a violent blow. It then stretched out two long arms, and began to twine them round the boat, whereupon one of the fishermen seized a small axe and severed both arms as they lay over the gunwale. The animal then moved off, ejecting such an immense quantity of inky fluid as to darken the water for several hundred yards. The fishermen estimated its length at 60 feet, its diameter at 5 feet; in shape and colour it resembled the common squid or Calamary, and it moved in the same way both backwards and forwards. One arm was destroyed, but the other was brought to St. John's, where it is preserved in spirits, though not before it had lost 6 feet of its length. It is 19 feet long, and as the fishermen judged that they left 10 feet attached to the body of the animal, the total length would have been 35 feet. Mr. Harvey also mentions that the bodies of two cuttles of the length of 40 and 45 feet respectively were cast ashore in 1870. In 1877 a huge squid was cast ashore in Catalina Bay and was conveyed in brine to the New York aquarium. It is the largest and finest specimen yet preserved, the body measuring 9½ feet in length and 7 feet in circumference, while its pair of long arms measured 30 feet each. Specimens of gigantic cuttles have also been recently found in the British seas, among which it may suffice to mention the largest recorded specimen, which was cast ashore at Kilkee on the Irish coast in the autumn of 1880. It was an octopus (the name applied to the eight-armed forms), and was about 30 feet long, its suckers being nearly the size of a shilling. From the occasional presence of such forms, the legends and myths of the kraken and other wonderful beings may have thus taken origin in fact, although the subsequent progress of the tale was wholly due to the progressive embellishments which it received from each successive narrator. The celebrated 'sea-serpents' may be briefly noticed in the present article, as being nearly akin in nature to the kraken. That marine serpentine forms have occasionally been seen by persons on whose veracity the greatest reliance can be placed, and under collateral circumstances which tend to strengthen the correctness of the observations, are facts which hardly admit of doubt in any sense, save perhaps as to the exact nature of the *form* which was observed. Unfortunately for the sober, calm, and judicial investigation of the matter, the 'sea-serpent' topic has become invested with such an amount of unjust ridicule that the question has essentially passed from the domain of scientific investigation, and from the position of a matter worthy the attention of *savants*. But that the topic is well worthy the attention of naturalists, is proved by the repeated instances of such occurrences that are brought under public and scientific notice, and which cause as repeated a ventilation of the subject without in any degree adding to its ultimate elucidation. The *a priori* grounds upon which a belief in the existence of a serpentine marine form of large size may be maintained are, firstly, those founded on its perfect compatibility with the conditions of life in known forms. We thus know of certain snakes or serpents which are aquatic in habits. Such are the Hydrophidæ of the Indian Seas—snakes of venomous kind, and which swim swiftly and far out to sea by means of their vertically-compressed tails. Knowing this fact, and likewise admitting the possibility of a gigantic form being occasionally produced, as in the case of the cuttle-fishes, we have thus found the first and essential elements for the presence of such a marine form as is occasionally said to appear, in warm latitudes especially. Then secondly, the discovery of entirely new species of whales, cuttle-fishes, and other marine animals, forms another *a priori* consideration in favour of the probable existence of marine anomalies, which are considered such, simply because they are new to science. These considerations, without pretending to negative, or on the other hand to assert the truth of any given or particular instance in which curious marine forms are reputed to have been observed, may yet tend to show the grounds on which the existence of such forms should be seriously considered; and why the numerous recorded instances should be afforded a chance of substantiation, by the straightforward investigation of every account which shall prove to have been founded on trustworthy evidence.

KRANACH, Lucas. See Cranach.

KRASNOIARSK (the Town on the Red Cliff), a town in Siberia, capital of the government of Yenisseisk, on a low tongue of land formed by the junction of the Yenissei and Kacha; lat. 55° 42′ N.; lon. 92° 50′ E. It consists of a spacious principal street, crossed at right angles by minor streets, and of two handsome central squares, and is built partly of brick, but chiefly of wood, painted outside in bright colours. The principal edifices are the cathedral, and a museum of Tartar and other antiquities col-

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lected in the vicinity. The manufactures, consisting of leather, droskies, sledges, and all sorts of carriages, are chiefly carried on by artisan convicts in a large public factory. There are also some gold-washings in the neighbourhood. It was founded by the government of Tobolsk, in 1627, as a fort for the convenience of fur-traders, and to serve as a centre for further conquests. Pop. 14,159.

KREASOTE. The heavier portion of the oil obtained from wood-tar, when properly purified, yields a colourless oily liquid of high refractive power, boiling at about 203° C., to which the name of kreasote is applied. This name—derived from the Greek *kreas*, flesh, and *sōtēr*, preserver—expresses the fact that this liquid is possessed of very marked antiseptic properties. If a piece of meat be plunged into a solution containing 1 per cent. of kreasote it becomes hard and dry on exposure to the air, and does not putrefy. Kreasote has a pungent taste and a penetrating odour; it is poisonous, but may be used for many medicinal purposes with good results. Crude pyroligneous acid owes its antiseptic properties chiefly to the kreasote which it holds in solution. The chemical history of this interesting substance is not yet complete, but it appears that we must rank kreasote among the monobasic acids, and assign to it the formula $C_7H_6\begin{cases}OCH_3\\OH\end{cases}$

KREFELD, a town in Rhenish Prussia, in the government of Düsseldorf, and 12 miles north-west of the town of Düsseldorf. It consists of spacious streets and well-built houses; is the seat of several courts and public offices; and is the principal locality in Prussia for the manufacture of silk and mixed silk goods, which was introduced by refugees from Juliers in the seventeenth and eighteenth centuries; the produce is estimated at £3,000,000 annually. The other manufactures are woollen, linen, and cotton cloth, wax-cloth, hosiery, soap, candles, paper, leather, chemical products, and tobacco; and there are several dye-works and print-fields. Pop. in 1880, 73,872.

KREMENETZ, a town in Russia, in the government of Volhynia, on the right bank of the Ikva, at the foot of a lofty hill crowned by a strong castle, 126 miles west by south of Jitomir. It has several Greek churches, a monastery, school, and botanical garden; and some general trade. Pop. 11,039.

KREMENTCHUG, a town in Russia, in the government of Poltava, and 67 miles south-west of the town of Poltava, on a sandy plain on the left bank of the Dnieper, here crossed by a magnificent tubular railway-bridge. It suffers much from inundations; has sugar-refineries, a saltpetre-work, a soap-work, a hat manufactory, and a considerable trade. The liqueurs and preserved fruits of the districts are in great repute. Pop., including Krjukov, 37,597.

KREMLIN, the name which is given in England to the *kreml*, that is, the fort or citadel of Moscow. It lies in the centre of the city, containing only the royal edifices and churches, particularly the residence of the emperor. It is surrounded by three thick walls and a deep fosse, with batteries. In the Kremlin are two convents, many churches, particularly the cathedral, in which the coronation of the Russian emperors is performed, and a gilded bell-tower 277½ feet high, called *Ivan Velikei*, 'the Great Ivan,' containing one gigantic bell 400,000 lbs. in weight, and another weighing 120,000 lbs. In the church of the Archangel Michael is the sepulchre of the emperors, and behind it the house of the former patriarch, where the synod now assembles, and a library is kept, which is rich in Greek and Russian manuscripts. In the castle the imperial colleges have their sessions; the arsenal is also there. In 1812, when Moscow was burned by the Russian authorities, part of the Kremlin was also destroyed. When Napoleon left Moscow Marshal Mortier received orders to blow it up. Alexander restored it.

KREMNITZ, or CREMNITZ (Hungarian, *Körmöczbánya*), a free mining town in Hungary, in the comitat of Bars, in a deep valley surrounded by seven lofty hills, 15 miles north of Schemnitz. It consists of the town proper, surrounded by walls, and containing a castle; and of several large suburbs, in which are almost all the public buildings. The manufactures consist of paper, delft-ware, vitriol, and cinnabar; but the prosperity of the town depends chiefly on the gold and silver mines which are wrought to a considerable extent in the vicinity. The motive power of the works connected with the mines is all derived from a stream of water which is led from the comitat of Turócz. The water is removed from the mines by means of an underground channel more than 9 miles long, built in 1851–52. Kremnitz was built at the beginning of the twelfth century, and inhabited by German colonists, who were invited by King Geysa II. to work the mines, and received great privileges from him. The present inhabitants are the descendants of these colonists. Pop. 8550.

KREUZNACH, a town in Rhenish Prussia, picturesquely situated on the Nahe, here crossed by an old stone bridge lined with houses, 21 miles south-west of Mayence. Though of antiquated appearance it is tolerably well built. It has extensive tanneries and salt-works. There are valuable mineral springs containing bromine and iodine at the place, which is therefore a great resort for summer visitors. The springs were discovered as early as 1478, but have only been used of late years for medicinal purposes. They are said to be particularly efficacious in cases of scrofula and chronic skin diseases, as a remedy for which they hold the first place among the baths of Germany. In the vicinity of Kreuznach there are the remains of a Roman camp, the so-called Heidenmauer, together with Roman graves, urns, coins, &c. The place is first mentioned in 819, under the name of Cruciniacum, as one of the royal residences of the Carlovingians, and the town which grew up around it is mentioned in documents as old as 881 and 974 under the forms Villa Crucenacha and Crucinaha. It was frequently taken and plundered during the Thirty Years' war. Pop. in 1880, 15,321.

KRIEGSPIEL (War-game), a game, as its name indicates, of German origin, which, though not of recent invention, has lately attracted considerable attention on account of the importance attached to it as a means of exciting among the officers of an army enthusiasm for their profession, and even instructing them to some extent in the nature of war-like operations. The credit of inventing the game belongs to one Herr von Reisewitz, who constructed blocks representing bodies of troops of a certain strength on the same scale as the war-maps he used, and used them in playing a game similar to that now played. It was invented at least as early as 1824. The game is played with maps on a large scale (in this country 6-inch ordnance survey maps), and coloured metal blocks, on the same scale as the map, representing bodies of troops of various strength (brigades of infantry, battalions of rifles, regiments of cavalry, besides artillery, engineers, pontoon troops, telegraph troops, &c.) Several officers play on each side, and an umpire and assistant umpire are also required. Before the game begins the umpire examines the maps and sketches out a general idea to be worked out in the game, such as that a country has been invaded along certain routes, and that the invading armies wish to effect a junction at a particular spot, and he communicates this general idea to each side some time before the game is to be played. He next

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sketches out a special idea for each side, indicating the general disposition of the forces on that side at the time when the movements of the armies in the game are supposed to commence, leaving it to the commander on each side to settle for himself with more detail the mode of drawing up his army, and each commander hands to the umpire a detailed statement of the position which he intends every battalion and troop of his forces to occupy at the beginning of the operations. The umpire then gives the commander of one side the blocks representing his men, and the latter places them on the map in the positions described in his detailed statement. This part of the map is then covered up, and the commander of the hostile force does the same with the blocks representing his men. Everything being thus prepared, the game may commence at any time that may be fixed between the parties. It is played by alternate moves. Each move represents the lapse of two minutes, and rules are given to determine the distance that each branch of the service may move over in that time, whether along a road or in a wood, and whether at ordinary marching speed or at a quicker rate. When two bodies of men on opposite sides come into contact, the weaker in numbers and position is held to be defeated; but when they are equal in these respects victory is determined to one side or the other by the use of a die. A table of results is also used to show the losses that are held to ensue to either side from an engagement in different circumstances.

KRIMMITZSCHAU, a town in Saxony, in the circle of Zwickau, 37 miles south of Leipzig, on the left bank of the Pleisse. It is a busy manufacturing town; the principal manufactures are needles, buttons, glue, woollen yarns, woollen and cotten fabrics. Dyeing and fulling are also carried on. Pop. in 1880, 18,925.

KRONSTADT. See CRONSTADT.

KROSSEN, a town in Prussia, on the left bank of the Oder, in the province of Brandenburg and government of Frankfurt, and 31 miles south-east of the town of Frankfurt. It is walled, and has several courts and public offices, and a castle. The manufactures are woollen and linen cloth, hosiery, leather, earthenware, iron, &c. There is a trade in wool and wine, and some shipping. Pop. (1880), 6746.

KRÜDENER, JULIANA, BARONESS VON, born about 1764 in Riga. At an early age she was married to Baron Krüdener, a Livonian, about thirty-six years old. She accompanied her husband to Copenhagen and Venice, where he was Russian minister. In these places, and in Petersburg, Madame Krüdener, placed by rank and wealth in the first circles, was one of their most brilliant ornaments. In 1791 she left her husband, and returned to her father's house in Riga; but her father dying soon after, she left Riga, and lived alternately in Paris and St. Petersburg. Her love of dissipation involved her, in Paris as well as in Petersburg, in many difficulties. In the former place the fierce Garat is said to have been master of her heart. In the midst of these circumstances she wrote a novel, of which she had formed the plan at an earlier period, Valérie, ou Lettres de Gustave de Linar à Erneste de G., in which she delineated certain scenes of her own life. The disasters of Prussia arrived, and Madame Krüdener, being then about the person of the Queen of Prussia, and participating in her affliction, turned her mind from the pleasures of the world to the subject of religion. She was now attracted by the principles of the Moravians. She again went to Paris, where she found many disciples. On the commencement of the war of the northern powers against Napoleon Madame Krüdener went to Geneva (1813). At Karlsruhe she became connected with the mystical Jung. She began to believe herself called to preach the gospel to the poor. She therefore went into the prison at Heidelberg, and preached to the criminals condemned to death. In 1814 she returned to Paris. In May, 1815, she had an interview, at Heilbronn, with Alexander, emperor of Russia, who had already for some time shown a disposition to religious contemplations; and it is very generally believed that her conversations in Paris with Alexander were mainly instrumental in suggesting the idea of the Holy Alliance. It is certain that in her later sermons she held it up almost as a new covenant. She gave a description of the feast celebrated by the Russian army in the plains of Châlons under the title Le Camp des Vertus, in which she gives her views respecting the history of the time. In 1815 she went to Basel, where a small community of devout mystics was already collected. Here a young clergyman of Geneva, called Empaytas, followed her, and preached in the prayer-meetings which the baroness held every evening. Women and girls went ardently to these prayer-meetings, and gave liberally to the poor, often to a degree much beyond what they could afford. These meetings, as is too often the case under circumstances of similar excitement, had a bad moral effect. Cases were reported which excited great scandal, and a preacher named Fasch finally denounced the priestess. The magistracy of Basel obliged her to leave the city. She experienced the same treatment at various other places, and after a short residence at Leipzig was at length conducted, in 1818, by the police, across the Russian frontier, where she received orders not to go to St. Petersburg nor to Moscow. In 1824 she went with her daughter and her son-in-law to the Crimea, and died at Karasu-Bazar, in that peninsula, towards the close of the same year.

KRUG, WILHELM TRAUGOTT, born in 1770 at Radis, near Gräfenhainchen, in the Prussian province of Saxony, entered the University of Wittenberg in 1788, studied afterwards at Jena and Göttingen, and returned to Wittenberg in 1794, where he continued to teach as adjunct of the philosophical faculty, but without receiving any regular salary. In 1801, however, he obtained an extraordinary professorship at Frankfort-on-the-Oder, where he published his principal work, entitled Fundamentalphilosophie, and containing a new philosophical system, which may be considered as an offshoot of the critical philosophy of Kant, and holds a kind of intermediate place between Idealism and Realism. This system long enjoyed an extensive popularity, and satisfied the philosophical wants of the general public. On Kant's death Krug, in 1804, became professor of logic and metaphysics at Königsberg, where he afterwards became also ordinary professor of practical philosophy. He here began to publish his System der theoretischen Philosophie. In 1809 he was called to take the chair of ordinary professor of philosophy at Leipzig. In 1813, when the public mind in Germany was generally aroused in favour of independence, Krug felt the inspiration, and attached himself to the mounted troopers of the Saxon banner. At the conclusion of the campaign he published his Encyclopädischen Abriss der Kriegswissenschaften. In 1833 he obtained a seat as deputy in the first constitutional diet. In 1834 he retired on a pension from his active duties as a professor, but retained his seat and vote in the senate and faculty, and continued to give philosophical lectures till his death in January, 1842. The Denklehre oder Logik of this writer was largely made use of by Sir William Hamilton in his lectures on logic. The principal events of his life have been given in an autobiography, entitled Meine Lebens-

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reise in sechs Stationen, von Urceus (Leipzig, 1826), and a supplement entitled Leipziger Freuden und Leiden im J. 1830 (Leipzig, 1831).

KRUMMACHER, Friedrich Adolph, known for his parables and other poetical pieces, was born in 1768 at Tecklenburg, in Westphalia. After he had long held the office of rector at Meurs, and of professor of theology in the University of Duisburg, he in 1807 accepted the office of reformed preacher at Krefeld, but during the same year exchanged it for a similar appointment at Kettwich in Westphalia. In 1819 he became court preacher and superintendent at Bernburg, and in 1824 went to Bremen, where he died in 1845. His hymn, Die Liebe (Wesel, 1801), was followed by his Parabeln, of which an eighth edition appeared at Essen in 1850, and in which he did not merely exhibit general practical truths under the guise of similes, fables, and poetical narrations, but with the higher aim of the Hebrew parable rose from the lower sphere of the sensible to that of the spiritual. In this line of poetry he has had many imitators, but few of them have equalled him in his tender conceptions of nature and of human life, and in his union of calm reflection with warmth of expression. Among his other works, which are very numerous, may be mentioned his Apologen und Paramythien (Duisburg, 1810), Die Kinderwelt, Bibelkatechismus, Katechismus der Christlichen Lehre, and Die Christliche Volksschule im Bunde mit der Kirche. Most of his works have passed through numerous editions.

KRUPP'S STEEL. See Steel.

KRUSENSTERN, Adam Johann von, a celebrated Russian navigator, born in 1770, at Haggud, in Esthonia, served in the war of 1793 on board the British fleet, and in 1798–99 made a voyage to India and Canton in a British China trader. In the end of 1799 he presented a memoir, for the improvement of the Russian American fur trade, to the court of St. Petersburg. It received no countenance from Paul I., but was taken up immediately after his accession by Alexander, who, on the recommendation of Admiral Mordvinnov, and the chancellor, Count Rumjanzov, intrusted Krusenstern with an expedition, having the double object of exploring the north-west coast of America belonging to the Russians, and re-establishing the interrupted trade with Japan. Two ships were accordingly placed at his disposal, and he sailed from Cronstadt on the 7th of August, 1803. Three years after, 19th August, 1806, he returned to the same harbour, without having lost a single man. The expedition failed to open the trade with Japan, but, besides the fame which it acquired as the first Russian voyage of discovery round the world, led to many important geographical discoveries, and threw much light on many important questions in physical and natural science, ethnography, &c. The principal results were given by Krusenstern himself in a valuable work, accompanied with atlas of 104 plates, which has been translated into almost all the languages of Europe. Later works by Krusenstern on the hydrography of the Pacific are not less important, especially for navigation. Krusenstern died on his estate of Ass, in Esthonia, in 1846.

KRYLOV, Ivan Andreëvitch, the most celebrated of Russian fabulists, born in 1768 at Moscow. In his fifteenth year he wrote a piece entitled The Coffee Prophetess, for which a bookseller gave him 60 roubles, which he spent in purchasing the works of Racine, Molière, and Boileau. In 1786 he had completed a tragedy, which was not acted, but appeared in The Russian Theatre. In 1788 he obtained an appointment in the cabinet of the emperor, but quitted it two years after to devote himself more exclusively to literary pursuits. He enriched the theatre with several new plays, became connected with literary journals, but soon ceased to have any connection with them, and published several prose plays, which met with much acceptance, and secured for him the favour of the Empress Catharine. In 1801 he became secretary to Galitzin, the military governor of Riga. Two years after he resigned this post, and accepted an invitation of Prince Galitzin to one of his estates in Saratov, where he remained three years. He then proceeded by way of Moscow to St. Petersburg, where at last, on the recommendation of Dmitriev, he began, at forty years of age, to devote himself to the species of poetry which has immortalized his name. The first collection of his fables, twenty-three in number, appeared in 1809, and met with general acceptance. In 1811 he became a member of the St. Petersburg Academy, in 1812 director of the Imperial library, in 1830 a councillor of state, and in the course of the same year saw himself so loaded with riches and honours, that when in 1841 he resigned his public office, he drew from the state and the imperial treasury the sum of about £1700. He died in 1844. His Fables, in consequence of their genuine national spirit, joyous humour, natural simplicity, wit, and kindliness, have become one of the most popular of Russian volumes, and many of their sentences have passed into proverbs. They are usually the first reading-book put into the hands of children, and hence thousands of copies, in expensive as well as cheap forms, are in constant circulation among all classes. A splendid edition has been printed at Paris by Count Orloff (Bossange, 1825), and, along with the original, is accompanied with French and Italian translations. German translations have also been printed, and there is an English prose translation, with an introductory notice of the author (Krilof and his Fables, by W. R. S. Ralston, Lond. 1869).

KUBA, a town in Russia, in the Caucasian government of Baku and the district of Kuba, on the right bank of the Kudialtchai, 47 miles S.S.E. Derbend. It is walled, flanked with towers, and has a castle and two suburbs, one inhabited by Jews, and the other by Armenians. The town is inhabited by Turcomans. Pop. 13,062.

KUBAN, or Kouban, a river in Europe, which rises in Circassia, nearly 14,000 feet above the level of the Black Sea, at the foot of Mount Elbruz, the loftiest peak of the Caucasus. It flows first north, then north-west, and ultimately due west, forming the boundary for above 300 miles between Circassia and Russia; passes Ekaterinodar, and, traversing a level steppe, presenting to the eye only an interminable plain of reeds, falls into the Black Sea, in the Bay of Kuban. This river can scarcely be said to be navigable. The water at its mouth is so shallow as to admit only the smallest vessels. All the tributaries of the Kuban flow, like itself, from the Caucasus Mountains, joining it on the left bank: the principal are the Zelentchuk, Urup, and the united streams of the Laba and Emansu. Total course about 400 miles.

KÛBLAI KHAN (more properly Khûbilai Khan), called by the Chinese *Chi-Tson*, a Mongol emperor, founder of the twentieth Chinese dynasty, that of the Mongols or Yuen. He was a grandson of Genghis Khan, and was born in 1214. In 1259 he succeeded his brother Mangû as Khagan or Grand Khan of the Mongols, and in 1260 he conquered the whole of Northern China, driving out the Tartar or Kin dynasty. He then ruled over the conquered territory himself, and nineteen years later added to it Southern China, the dominion of the Song dynasty,

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which had originally summoned his assistance in driving out the Tartars from the north. Kûblai thus became sole ruler of an empire extending over a large part of Asia, as well as over those parts of Europe that had belonged to the dominions of Genghis Khan, from the Dnieper to Japan. He repaired the evils of so many wars by a wise administration, and by the encouragement which he gave to letters, commerce, industry, and agriculture, brought them all to a very flourishing condition. Marco Polo, the celebrated Venetian traveller, who lived seventeen years at the court of this prince, gives some interesting information regarding him. Kûblai Khan is the subject of a poetical fragment by Coleridge. He died in 1294.

KUHHORN, or ALPHORN, a wind-instrument used by the herdsmen of the mountainous regions of Germany. It is about 3 feet long, and widens out towards the end. It is made of wood or willow bark. Its mouth-piece is like that of a trombone. The notes are usually only five in number, namely, C, G, C, E, G; but limited as the scale of the instrument is, the herdsman often manages to produce with it melodies which, heard in the mountain solitudes where he dwells, are inexpressibly charming.

KUKAWA, a town in Western Africa, the capital of Bornou, about lat. 12° 55′ N.; lon. 13° 26′ E.; about 20 miles west from the south-west shores of Lake Chad. It consists of two distinct towns, an east and a west, about half a mile apart, each surrounded by a white clay wall. In a great market, situated immediately west of the west town, a large fair is held every Monday, and presents an interesting spectacle. The principal articles for sale are mats, and other materials for the light buildings common throughout the country; corn exposed in long rows of leathern bags; camels, often a hundred or more; numbers of horses; textile fabrics, cloths, shirts, beads of all sizes and colours, leather-work, coloured boxes of every shape and size, very neatly made of ox-hide, and little boxes made of the kernel of the fruit of the doum-tree. Last of all must be mentioned slaves, for the sale of whom a special place in the market is assigned. The number of persons attending the market often amounts to 12,000 or 15,000. Pop. (estimate), 60,000.

KU-KLUX KLAN, a secret society of a socio-political nature, which was called into being chiefly by the reconstruction measures which the government of the United States passed with reference to the rebel states of the south which had been subdued in the war of 1861–64. Official inquiries have brought to light that the society originated about 1867 in some counties of North Carolina, and rapidly spread over nearly all the states of the south, but especially South Carolina, Georgia, Alabama, Mississippi, Kentucky, and Tennessee, embracing all the enemies of the Union and supporters of slavery. The members of the society, who are bound by a solemn oath to secrecy, under the penalty of death for divulging anything connected with its organization, did not hesitate to commit any act of violence, even murder and arson. They met at certain times at fixed places, and when engaged in any of their criminal raids were always mounted on horseback, and completely disguised. The political character of the association was clear from the fact that all the acts of violence of which they were guilty were committed against negroes, recognized supporters of the Union, government officials, adherents of the Republican party, which, since 1861, has been the dominant one in the United States, the free schools which were founded under the protection of the government of the Union, and into which negroes as well as white persons were admitted for instruction; and, in short, against everything which was obnoxious to the feelings of the Democratic party; as also from the circumstance that the leaders of that party throughout the Union lost no opportunity of representing the lawless acts of the Ku-Klux bands in a milder light, and even excusing them as the natural results of intolerable oppression. The enormities committed by this society were brought under the notice of Congress in May, 1870, and a law was passed sufficiently severe in its character to put an end to them; but on account of the great dimensions to which the society had grown, it was scarcely ever found possible to carry out the law in a satisfactory manner. The violation of the law by the Ku-Klux was most frequent and daring in South Carolina, formerly the cradle of the agitations for secession. In March, 1871, matters had gone so far that the governor of South Carolina officially requested President Grant to send him a military force to aid him in extirpating the evil. President Grant laid the matter before Congress, which, in the middle of April, 1871, passed (in spite of the opposition even of some members of the Republican party, who apprehended danger to republican freedom) an anti-Kuklux law, which suspended the Habeas Corpus Act in the districts in which the society created most alarm, and conferred upon the president an almost dictatorial power for its suppression. Since then less has been heard of the Ku-Klux atrocities. As to the origin of the name Ku-Klux Klan, nothing can be stated with certainty. According to some the first part is onomatopoetic, imitating the sound of the cocking of a rifle or revolver. The second part is no doubt merely another spelling of clan.

KULDJA, GULDJA, or ILI, called by the Chinese HOEI-YUAN-TCHING, a city in Dzungaria, on the right bank of the Ili River, capital of the district of the same name, lat. 43° 46′ N.; lon. 82° 30′ E. It is inclosed by a stone wall, and contains barracks, forts, granaries, and public offices for the use of the government. It carries on a considerable trade with China, through the cities in the province of Kansu. The inhabitants are chiefly Manchoos, but many merchants from Turkestan and Cashmere, &c., and a number of Russians reside in it. Pop. unknown, variously estimated from 20,000 to 70,000.

KULM.—1. A town in the Kingdom of Prussia, in the province of West Prussia, and the government of Marienwerder, and 33 miles south-west of the town of Marienwerder, on the right bank of the Vistula. It is walled, has several courts and public offices, a theological seminary, and a missionary convent; manufactures of woollen cloth, and a trade in cattle. Pop. 9937.——2. A village in Bohemia, about 9 miles north-east of Teplitz, where, on the 29th and 30th August, 1813, a great battle was fought, in which the allies under Barclay de Tolly totally destroyed the French army under Vandamme.

KUMAON, or KAMAUN, a large district of Northern India, in the North-west Provinces. It is bounded N.W. by the district of Garhwal, S. by the division of Rohilkund, E. by Nipál, and N.E. by the Himálayas; lat. 29° 20′ to 30° 55′ N.; lon. 78° 30′ to 81° E.; area, 6000 square miles. The country consists of a succession of mountain ridges, which intersect each other, and gradually become more elevated towards the north. Deep and irregular dells intervene between the ridges, but so narrow as scarcely to deserve the name of valleys. Extensive tracts of table-land occur, forming a kind of savannahs, which are covered with high reedy grass, with scarcely a tree, or even a shrub. As the hills are approached the tree jungle becomes thicker, and as the altitude increases the vegetation changes with the changing temperature, till it becomes European. Throughout the lower part of

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the district the tea-plant grows wild, but is said to possess an emetic quality which renders it useless. The climate is, on the whole, very unfavourable, and the people suffer from a host of diseases. The fauna is extremely rich, comprehending some of the most savage animals. Birds are particularly numerous and splendid, and the list of brilliant insects is almost endless. The domestic animals are cows, buffaloes, sheep, goats, ponies, and in the northernmost districts yaks. Minerals are abundant. Copper, iron, and lead are worked to some extent. Gold is also found. The ordinary kinds of grain and pulse grow freely; besides tobacco, caraway, coriander, &c., all of which come to maturity in spring. Rice, cotton, indigo, maize, millet, cucumbers, ginger, &c., are obtained in autumn. The tea culture has also been introduced into the district, and is making considerable progress. The shrubs are managed on the Chinese system, and succeed well. The manufactures are few and coarse, but a considerable trade is carried on, the traders often descending far into the south, and exchanging their minerals, dyes, drugs, and roots, for coarse chintzes, cottons, sugar, &c. The people are mostly of Hindu origin. They are divided into Brahmans (of whom there are said to be about 6000 families scattered over the district), Rajputs, and Doms, or those not belonging to any caste, who form the artisan class, and are hereditary slaves of black colour and with woolly hair. Among the hill tribes are the Khasiyas, apparently the descendants of the so-called aborigines. The prevalent language is the Hindu, and Brahmanism is the predominant religion, but is rapidly declining and giving place to a superstition which, like Shamanism, assigns a particular divinity to every natural object. Pop. in 1881, 493,641.

KUNERSDORF, a village in Prussia, in the province of Brandenburg, near Frankfurt-on-the-Oder, celebrated for the victory which the combined Austrians under Laudon, and Russians under Soltikov, here gained over Frederick II. of Prussia, on the 12th of August, 1759.

KUR, or better KURA (ancient *Cyrus* or *Kûros*), a large river of Western Asia. It has its sources in Asiatic Turkey, in the pashalic of Kars, about lat. 40° 40′ N.; lon. 42° 20′ E., from which it flows N.E., traversing the Russian government of Tiflis, continuing this direction to about lat. 42° N., when it bends round to the S.E., passes the city of Tiflis, and holds on this course through the governments of Elizabethpol and Baku to about lat. 40° 5′ N., at which point it turns nearly due south, and ultimately falls into the Caspian Sea a little to the north of the Gulf of Kysylagatch, after a course of between 500 and 600 miles. It has numerous large tributaries flowing from both the north and south; of these the principal is the Aras or Araxes, which joins it about 60 miles from its mouth. The other chief affluents are the Alaxan and Yora, both from the north.

KURDISTAN (Land of the Kurds), an extensive territory of Western Asia, comprehending the greater part of the mountainous region which borders on the western side of the great plateau of Iran or Persia, and stretches westward till it overhangs the low plains of Mesopotamia on the south-west, and reaches the borders of the Turkish provinces of Diarbekir and Erzerum on the north-west. As it does not form a separate political division, its exact limits are not ascertained; but the eastern part of it forms the Persian districts of Ardelan and Kermanshah, in the province of Irak Ajemi, and the remainder, constituting the far larger portion, is in Turkey, where it forms the principal part of the pashalic of Van, and a considerable part of that of Bagdad. Its limits, as thus defined, lie between lat. 34° and 39° N.; and lon. 42° and 47° E., and must inclose an area of nearly 40,000 square miles. The surface is very mountainous, and is traversed by lofty ranges stretching north-west to south-east, in directions nearly parallel. The spaces between the mountains are sometimes intersected by deep valleys, but more frequently form a rugged table-land, which in some parts has a height of 6000 to 7000 feet. The whole surface on the west of the Persian frontier, being situated between the Tigris and the Euphrates, is drained by these two rivers and their tributaries. The Tigris receives the far larger share, both directly and by its important affluents the Great and Little Zab. Unless Lake Van is considered as partly within the territory, there are no lakes of any consequence. Owing to its general elevation Kurdistan escapes the scorching heats by which Mesopotamia suffers so severely. Its loftier summits are, for the most part, covered with fine forests of oak and other hard timber, while at lower heights magnificent walnut-trees abound. Many of the valleys and long terraces, lining the mountain sides, are under regular culture, presenting fine corn-fields, orchards, and vineyards. One of the most remarkable vegetable productions is manna, expressively called in Turkish *Kudret-halvassiz*, or the *Divine sweetmeat*. It is used as food both in its natural state and as an ingredient in sweetmeats. Among domestic animals the first place is due to the horse, which is of a remarkably fine breed, is used exclusively for riding, and is in great demand by the Turks and Persians for cavalry. The chief beast of burden is the ox, of which great numbers of a large size are kept; the ruggedness of the ground very much limits the use of the camel. Sheep and goats, the former remarkable for the excellence of their wool, are kept in large flocks.

The Kurds, to whom the territory owes its name, are not confined within its limits, but are found in considerable numbers eastward in Khorasan and over the hilly region of Mesopotamia, as far west as Aleppo and the Taurus. They are a stout, dark race, well formed, with dark hair, small eyes, wide mouth, and a fierce look. Almost every man is mounted, and is provided either with javelins about 3 feet 9 inches long, or a bow of horn nearly 6 feet long, and a well-supplied leathern quiver. The sling which Xenophon saw when he passed through the country with the 10,000 Greeks, is still in use. Many of the tribes continue to lead a migratory life; and though there are numerous small villages seated generally on the sides of hills, the inhabitants to whom they belong quit them after seed-time for the mountains, and there remain pasturing their herds and flocks till the recurrence of harvest invites them to return. The language is of the same stock as the modern Persian, but has degenerated more from not having been fixed by writing. The great body of the Kurds are Mohammedans, but allow their women a much greater liberty than the Koran sanctions. A veil is worn by the higher, but dispensed with by the middle and lower classes. As the Kurds have few wants, they are very indifferent about trade. They send, however, chiefly to Kirkuk, which is their principal entrepot, but partly also to Hamadan, Bagdad, and Mosul, gall-nuts, tobacco, honey, sheep-skins, and cattle; obtaining in return coffee, rice, leather, and clothing, chiefly cotton goods. Kurdistan was known to the ancients under the name of *Corduene*, and its inhabitants under that of *Carduchi*. Under the ancient Persian monarchy they were included partly in the province of Assyria and partly in that of Modia. After the time of Alexander their territory formed part of the Kingdom of Syria, but was dissevered from it by the Parthians about three centuries before the Christian era. They afterwards formed part of the new Persian Empire, and on its destruction

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passed to the caliphs of Bagdad. At the present day they owe but slight allegiance to the Turkish sultan, living in tribes partly stationary and partly nomadic, under their own chiefs, who commonly exact duties on the merchandise which passes over their territory, which is traversed by the caravans between the Upper Euphrates and Asia Minor. The famous Sultan Saladin was a Kurd. It is very difficult to form even an approximate estimate of the whole Kurd population; the Turkish portion is supposed by Chesney to contain above 2,500,000, and the Persian portion is roughly estimated at 400,000.

KURILES, a chain of islands in the North Pacific, extending south-west to north-east, from the Japan Islands to Kamtchatka; lat. 43° 40′ to 51° N.; lon. 145° to 156° E. They are divided into the Great and the Little Kuriles, both of which groups belong, since 1875, to Japan. These islands, in many parts destitute of water and uninhabited, form part of the volcanic zone, which, passing through the Aleutian Islands, Kamtchatka, and Japan, extends to the Philippines, Java, &c.; they are of a very wild and uninviting aspect; their coasts bristle with dangerous rocks, which, with the violent currents prevailing, especially on the east side, render access difficult. Some of the mountains rise nearly 6000 feet above sea-level; eighteen of them are volcanoes. Earthquakes are frequent. Copper, iron, and sulphur are found. The vegetation is meagre, and the cultivation of the soil almost totally neglected; indeed in the northern islands it is utterly so. The climate in general is far more inclement than in most other parts of the globe under the same latitude, and fogs are frequent. The limited commerce of the Kuriles is mainly carried on with Japan and China; it consists of fur, whale-oil, eagle-plumes, and dried fish, in exchange for which cloth and silk stuffs, Japan ware, and tobacco are received. The people are small, with round flat faces, dark hair and beard, and the body much covered with hair. They are gentle, hospitable, and courteous, but utterly devoid of all spirit to resist oppression, and prefer death to any suffering; hence suicides are of frequent occurrence amongst them.

KURISCHES HAFF, an extensive lagoon in East Prussia, on the south-east shore of the Baltic, from which it is separated by a narrow belt of sand, and with which it communicates at Memel by a flood-gate. It is nearly triangular in shape, widest at the south, and gradually narrowing to a point in the north at its outlet. Its greatest length is about 54 miles, and its breadth from east to west, near the middle, 14 miles. It receives the Niemen or Memel and several other smaller streams. On the belt of land which separates it from the sea, and which is called the Kurische Nehrung (that is, Niederung, 'low land'), the sand is gradually rising. Vegetation is thus destroyed, and many small places have already been buried. The inhabitants who originally dwelt along the lagoon were called *Kuren*, and hence its name.

KURRACHEE, or KARÁCHI, the principal seaport town on the coast of Sind, situated on a low sandy shore on the side of a large and commodious creek or inlet, forming a good haven, perfectly safe in all winds, and out of the track of cyclones. It is connected by a railway, 105 miles long, with Kotri on the Indus, opposite Haidarabad. The harbour is formed by a long narrow strip of sand on the west, ending with a rocky promontory called Manora Head; and by the Island of Kiamari on the east. The entrance to the harbour is on the west side of this island. Here the navigation was formerly very much impeded by a bar which left a depth of water of only 9 to 12 feet at low water spring-tides; but the government has now constructed important works for the removal of this bar. These consist in a mole blocking up the passage called Chinna Creek, on the east side of the Island of Kiamari, thus forcing the tide to enter and return by one passage, so as to increase the volume of water passing over the bar, and aid in scouring it; a groin stretching in a south-easterly direction from the western point of Kiamari Island, intended to confine the course of the water, so as to guide the whole force of the scour to the bar; and a breakwater, constructed also in a south-easterly direction, and intended to protect the entrance of the harbour from the south-west monsoon, by the action of which the bar is caused. Since the construction of these works the depth of the entrance to the harbour has been increased, with the aid of dredges, to 20 feet nearly throughout. On Manora Head there is a lighthouse 120 feet high. The mean temperature is 78° F., and the climate is disagreeable, though not unhealthy, for Europeans. Pop. in 1881, 73,560. The district of Kurrachee lies at the mouth of the Indus, chiefly on its right or west bank. It consists of a rather sterile hill country, fruitful lowlands, and a marshy delta. Area, 16,109 square miles; pop. (1881), 478,688.

KURSK, a government in Russia, bounded on the north by the government of Orel, west by Czernigov, south by Poltava and Kharkov, east by Voronej; greatest length, west to east, 190 miles; greatest breadth, north to south, 135 miles; area, 18,901 square miles. The surface is undulating, with numerous little hills and gentle acclivities, consisting of a rich fruitful soil, and is studded over with towns and villages. The acclivities consist of shell-marl, limestone, and sandstone; and on the banks of almost all the streams layers of chalk appear. The chief river is the Sem, which, rising on the east confines of the district, traverses it east to west on its way to join the Dnieper. The Donetz also has its source here, and waters part of the south. The climate is mild and dry, and the rich soil produces abundant crops at comparatively little trouble and expense. Apples, plums, and cherries abound. Agriculture and its usual attendant, the rearing of cattle, employ the greater part of the inhabitants, and leave only a small surplus for other occupations. These are chiefly manufactures of army clothing and other coarse stuffs for the use of the peasantry. The exports are grain, cattle, leather, wax, and honey. Pop. 2,239,397.

KURSK, a town in Russia, on the right bank of the Tuskar, near its junction with the Sem, 220 miles east of Czernigov, capital of the government of the same name. It has the remains of an ancient fortress, and the earthen rampart with which the town was surrounded has been formed into an agreeable promenade. The principal public buildings are the cathedral of the Resurrection, the cathedral of St. Sergius, and a monastery. A considerable trade is carried on both with St. Petersburg and Moscow. To the former are sent honey, wax, tallow, leather, tow, hemp, oil, fox and wolf skins; to the latter large numbers of cattle and horses. The environs contain numerous gardens and orchards. Pop. 31,754.

KUSNEZK (a Smith's Forge), a town in Russia, in the government of Saratov, on the Trussva, 112 miles east of the town of Saratov. It is surrounded with gardens, and has extensive tanneries, numerous smithies, and a trade chiefly in wood. Pop. 14,186.

KÜSTENLAND (Coast-land), an administrative division of the Austrian Empire, consisting of the county of Görz and Gradiska and the margraviate of Istria with the town of Trieste; area, 3084 square miles. The land is for the most part mountainous, and is traversed by various small rivers, the chief of

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which is the Isonzo. Agriculture is the chief support of the population, but vine-growing and the rearing of silkworms are also carried on, especially in the south. The manufacturing industries are, except at Trieste, of little importance. Although the territories mentioned as forming the Küstenland are constituted for administrative purposes into a single division of the Austrian Empire, the governor of which has his residence at Trieste, yet the county of Görz and Gradiska and the margraviate of Istria have each a separate landtag, and Trieste, with the surrounding district, has an independent municipality having authority to deal with local affairs. The majority of the inhabitants are of Slavonic origin, but there is also a large proportion of Italian Friulians and a considerable number of Germans. Pop. (1880), 617,934.

KÜSTRIN, or CÜSTRIN, a town in Prussia, in the province of Brandenburg and government of Frankfurt, 16 miles north of the town of Frankfurt-on-the-Oder, at the junction of the Wartha with the Oder, which is here crossed by a bridge. It consists of the town proper and three suburbs, and is strongly fortified both by nature and art, being situated among lakes and marshes, which make a hostile approach to it extremely difficult, and surrounded by walls, and defended by several outworks. It contains a castle in which Frederick the Great was confined by his father, and has manufactures of woollens, bolting-cloth, hosiery, leather, and starch. Pop. 14,069.

KUTAYA, KUTAHIYAH, or KUTAIAH (ancient *Cotiæum*), a town in Asiatic Turkey, in the pashalic of Anatolia, 180 miles north-east of Smyrna, on the route between Constantinople and Konia. It lies on the Pursak, at the entrance of a valley, and at the foot of the Pursal Tagh, on the west side of an extensive upland plain, nearly 50 miles long by 20 wide, and probably more than 4000 feet above the level of the Black Sea. It contains a number of mosques, khans, baths, fountains, bazaars, and about 10,000 houses with tiled roofs. Subterraneous aqueducts run beneath the streets. This town is remarkable in modern times as the centre of the tract where the famous Turkey carpets are manufactured. Close by the S.S.W. side of the town, on a high hill, stands a large castle, a portion of which is ancient. Kutaya is the usual residence of the Vizir of Anatolia. About 17 miles E.S.E. of Kutaya are interesting Phrygian remains, with inscriptions; and the Troglodyte habitations of Doganlu, supposed to be the ancient Nicoleia. Near this town the Turks were defeated by the Egyptians under Ibrahim Pasha in 1833. Estimated pop. 60,000.

KUTTENBERG, a town in Bohemia, in the circle of Czaslau, on a stream of same name, 38 miles E.S.E. Prague. It is very well built, has a civil and criminal court, several public offices, a beautiful Gothic church; manufactures of woollen and cotton stuffs, smelting furnaces, and refineries of silver and other metals. The mines, including silver, copper, lead, arsenic, zinc, and calamine, to which the town owed its existence and a long course of prosperity, are still worked, but to much less advantage than formerly. Pop. (1880), 13,154.

KUTUSOV, MIKHAIL LAVIONOVICH GOLENISHCHEV, PRINCE SMOLENSKY, a Russian field-marshal, born in 1745, entered the army at the age of sixteen, served in Poland from 1764 till 1769, and afterwards against the Turks, under Romanzov. He stormed the fortress of Shumla, and at a later period contributed greatly to the subjugation of the rebel Pugachev. In 1788 he was present at the siege of Ochakov, having been appointed governor-general of the Crimea the year before. At the siege of Ochakov he was wounded near the right eye. He assisted the Prince of Coburg to gain the victory of Fockshani, and in the memorable conflict of Rimnik in 1789 he greatly distinguished himself by his bravery. After the storming of Ismail under Suvarov he was advanced to the rank of lieutenant-general, and in the negotiations with Turkey which took place shortly after he gained the fame of an able diplomatist. In 1793 he was appointed ambassador at Constantinople, and in the subsequent Polish war we find him again in the Russian army under Suvarov. He was particularly conspicuous during the memorable day of Praga (Nov. 5, 1794). After the restoration of peace Kutusov was first appointed commander-in-chief of Finland. After this he was appointed chief of the corps of cadets, and in 1801, on the assassination of the Emperor Paul, governor-general of St. Petersburg. In 1805, when he was at the age of sixty, the Emperor Alexander gave him the chief command of the first Russian corps against the French. He led it towards the Inn, but did not arrive there until after the capitulation of Ulm, upon which he united himself with the small Austrian corps of General Kienmayer, and checked the whole of the French army. On the right bank of the Danube, to which he had crossed, he was closely pursued by the French, and had several engagements with them, especially that near Dürenstein, where he encountered Marshal Mortier on the 18th and 19th November, the issue of which contest was fortunate for him. The Emperor of Germany sent him on this occasion the grand-cross of the order of Maria Theresa. Hereupon, having joined the other Russian corps, he commanded the allied army, under Alexander, at Austerlitz, where he was wounded. In the Turkish war he received orders from Alexander to close the campaign on the Danube. This being done Kutusov returned to Russia, and was appointed to supersede Barclay de Tolly, after the first retrograde movement, in the war against Napoleon in 1812. After the bloody battle on the banks of the Borodino, resulting in the defeat of the Russians, he imitated the Fabian tactics of his predecessor, and effected a skilful retreat before an enemy whom it would have been dangerous to attack in all his force, waiting till the enemy should have been partly destroyed by the frost before he again began to harass him. He then gained over the French the battle of Krasnoi, near Smolensk, which won for him the title of Prince Smolensky. Foreseeing the fate which awaited the retreating enemy on the banks of the Berezina, he pursued but slowly, and the campaign was already at an end when he reached Vilna, where he received his emperor. This campaign had exhausted Kutusov's strength. He was not in favour of a continuation of the war; for to him, a man beyond seventy years of age, it appeared too bold an enterprise to attack the enemy in the seat of his power. After having issued the celebrated Russian proclamation from Kalish, he died at Bunzlau, April, 1813.

KUYP, or CUYP, ALBERT, a painter of great originality and merit, was born at Dordrecht (Dort) in 1605. He was the son of an able landscape-painter, whom, however, he far exceeded, and became one of the most agreeable artists that ever lived. He particularly excelled in the purity and brilliancy of light; and he was not surpassed, even by Claude or any other painter, in an accurate representation of the atmosphere, and of the lightsome effects of sunshine. The works of this artist, of whose life very little is known, embellish some of the finest collections in Britain; and as they are very highly finished, that circumstance, added to the number of them, implies a long life. The gallery of the Duke of Sutherland, in particular, contains some highly valued pictures by Kuyp. The exact date of his death is

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unknown, but he was buried in the Augustine church of his native place on the 7th of November, 1691.

KYANIZING, a process for preserving timber, cordage, &c., from the effects of dry-rot, named from the inventor, a Mr. Kyan. It consists in immersing the material to be preserved in a solution of corrosive sublimate and water, in the proportion of 1 lb. of the former to from 10 to 15 gallons of the latter, according to the strength required. The time during which timber must be allowed to remain in the solution depends upon its size and thickness. For boards and small timbers twenty-four hours are required for each inch of thickness. When the materials undergoing the process are thoroughly saturated, they must be gradually dried under cover, so as to be protected from the sun and rain. Deals and timber not exceeding 3 inches in thickness will be perfectly dry in about 14 days. This process is now almost entirely disused, as wood is much better preserved by being saturated with kreasote or coal-tar.

KYRIE ELEISON (from the Greek *Kyrie eleēson*, 'Lord, have mercy'), a kind of invocation which opens the mass. It is almost the only part of the liturgy in which the Latin Church has retained the use of Greek words. When the mass is said, the priest and those to whom the mass is administered repeat alternately three times 'Kyrie eleison,' and then as many times in the same manner 'Christe eleison,' and so on alternately. When it is sung the leading singer takes the part of the priest, and the choir that of the congregation. The introduction of the Kyrie into the mass is attributed to Pope Sylvester I., in the beginning of the fourth century.

KYRLE, JOHN, surnamed by Pope the *Man of Ross*, an English gentleman who possessed an estate of £500 a year at Ross, in Herefordshire, where he died in 1724, at the age of ninety. Dr. Warton, in his Essay on the Writings and Genius of Pope, says Kyrle was the Howard of his age, and that he deserved to be celebrated beyond any of the heroes of Pindar. The splendid eulogium of the poet on the Man of Ross is well known.

L.

L, in the English alphabet, the twelfth letter and the eighth consonant; one of those called by some grammarians *liquids* (*l, m, n, r*), because, like vowels, they may be pronounced for any length of time, although this characteristic also belongs to *s, z, f, v*, and other consonants. The sound represented by *l* is produced by placing the end of the tongue against the fore part of the roof of the mouth, opening the jaws, and gently breathing out the air, which thus escapes from the corners of the mouth. The pronunciation of *l*, therefore, is not dependent upon the teeth; yet there are individuals, and even whole tribes, who do not pronounce it—the former in consequence of some defect in their tongue; the latter, because they (for example, the Japanese) always use *r* instead of *l*, whilst others (as the Chinese) always use *l* instead of *r*. In the old Zend there was no *l*. It must be observed that the rolling *r* is different from the *l* only in this, that the former is pronounced with a vibration of the tongue, the tip of which scarcely touches the roof of the mouth. Hence the constant interchange of *r* and *l*, in many languages, which it is important for the etymologist to observe. Thus the French *orme*, from the Latin *ulmus;* from the Latin *peregrinus*, the Italian *pellegrino*, the French *pelerin*, the English *pilgrim*. Of the German word *kirche* (Scotch, *kirk*) the Swiss make *kilche*. The much more frequent change, we presume, is from the *r* to the *l*, as from the more difficult to the easier; yet not always. Thus the lower classes in Rome say, instead of *repubblica, repubbrica*. How frequent the change of λ and ρ is in Greek, particularly in the Ionian dialect, every philologist knows. *L* is also interchanged with the liquid *n*, as in the Latin *lympha*, from the Greek *numphē*. This was especially common in the dialects of ancient Greece. It is likewise found taking the place of *d* and *t*, owing to the similarity of the mode of formation of these consonants to the mode in which *l* is formed. The Latin *lacryma* and the Greek *dakru*, and *odor* for *olor* from *oleo* in Latin, are instances of the first interchange; and the English *tongue* and Latin *lingua*, of the second. An *l* following a consonant in Latin is frequently changed into a short *i* in Italian, as *flaccus, fiacco; flos, fiore; blancus, bianco; glacies, ghiaccio*, &c. This happens also when a short vowel intervenes between the *l* and the previous consonant, as *macula, macchia*. Sometimes also this consonant is transposed, as in the Spanish *palabra*, from the Latin *parabola*. In Greek the letter was called *lambda*, the name being derived from the *lamed* of the Phœnicians and the Hebrews. It is somewhat remarkable that in so many alphabets *l* is composed, in some way, of two straight lines. We find in most ancient Greek alphabets the lambda thus, ⋁, ⋀, ⋁; in the Etruscan alphabet, ⟩; in the Celtic, ᚳ, ⋁. The classical and modern Greek is Λ; the Latin, L; in short, two straight lines always form this letter. In Spanish *ll* are pronounced liquid, like the Italian *gl* before *i* (like *lli* in *million*); and it is peculiar to this language that it begins words with this sound, as *llaneros*. In Portuguese the same sound is expressed by *lh*. The French *ll*, if preceded by *ai, ei, oui*, is liquid (*mouillée*), which in most parts of France is pronounced like the Italian *gl* in *egli;* but the Parisian pronunciation, originally a mere provincialism, is almost like our *y* in *you*, as in *travailler, veiller;* and probably this pronunciation will finally prevail, though it is arbitrary, and against the practice of the majority of the people. An initial *ll* in Welsh, as in *Llanrwst*, is pronounced like an aspirated *l*, the tip of the tongue being placed farther back in the mouth than for the formation of an ordinary *l*, and the breath emitted through the teeth on both sides of the tongue. In English *l* is not pronounced at all in some monosyllables, where it intervenes between a vowel and a subsequent consonant, as in *calm, half, balk, chalk, would, could, folks*. In those languages in which *l* is the consonant of the definite article, as in French and Spanish, it has in some cases come to be treated as belonging to the noun following, and in other cases has detached the initial vowel of the noun. The French *lierre* (ivy), formerly written *l'hierre*, from the Latin *hedera*, is an example of the first case; and the Italian *la lena* (breath), for *l'alena*, from the Latin *halena*, is an example of the second.

As a numeral, L signified in Hebrew 30; in Greek, λ = 11, and $\overset{,}{\lambda}$ = 30,000. L in Latin signifies 50. Λ on Greek coins means *Locris, Laconia, Lampsacus, Lacedæmonia*, &c.; on Roman coins it means *Lucius*,

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Lepidus, libertas, libra, ludos, libens, &c. L, with a dash over it, meant among the Romans 50,000. L. A. Q. M. is an abbreviation of *literarum artiumque magister*; £, the English abbreviation for *pound* (sterling), from *libra*, the Latin for *pound*. See ABBREVIATIONS.

LA, in music, the syllable by which Guido denotes the sixth note of the diatonic scale.

LAALAND, or LALAND (pronounced *Lolland*), an island in Denmark, S. of Seeland; washed on the N. by the Wordenborg Binnenmeer, forming a continuation of the Great Belt; E. by the narrow Guldborgsund, separating it from Falster; S. by the Baltic, and W. by the Langeland Belt, separating it from the island of that name; greatest length, S.E. to N.W., 36 miles; breadth, varying from 9 miles to 17 miles; area, 462 square miles. The surface, as implied by its name, meaning 'low land,' is so very little raised above the sea, that parts of it along the coast are subject to frequent inundations; and for a considerable distance around it the water is so shallow that there are few places in which vessels drawing 8 feet can approach it without danger. Mists are frequent, and the climate is not healthy, at least to strangers. The soil, consisting generally of a heavy loam, is very fertile, and yields excellent crops of corn. Beans, hops, and hemp are extensively grown. Wood also, including oak, and others of the best varieties of hardwood timber, is abundant. There are several lakes, of which that of Maribo, near the centre, is of considerable extent. For administrative purposes it is included with Falster in the bailiwick of Maribo. Pop. (1880), 97,007.

LAAR, or LAER, PIETER VAN, surnamed *Il Bamboccio*, a painter, born in 1613 at Laaren, a village near Naarden, in Holland, enjoyed during sixteen years the society of the most distinguished artists, viz. Poussin, Claude Gelée (Lorraine), Sandrart, &c., and had considerable influence on the taste of the Italians. In 1673 or 1674 he put an end to his life at Haarlem, probably from hypochondria. He received his surname during his residence at Rome. Even in his earliest youth it was his constant occupation to draw everything which he met with. His memory served him so admirably that he could represent objects most strikingly which he had only seen once or a long time previous. He was also one of the greatest musicians of his time. He only attempted minor objects, such as fairs, children's games, hunting scenes, landscapes, &c., but his paintings possess great power and animation.

LABADIE, JEAN DE, a mystic and separatist, born in 1610 at Bourg in Guienne, was educated at Bordeaux by the Jesuits, and belonged to their order till 1639. He then quitted it, both because irregularities were detected in his conduct, and he was found to have adopted many very peculiar and extravagant views. For these he was cited before the parliament, but fled to Geneva. At a later period he returned to France, and took up his residence in Amiens, whose bishop intrusted him with the visitation of the monasteries in his diocese. He also found a patron in the Archbishop of Toulouse. His zealous opposition to the Romish clergy subjected him again to persecution, and to escape from it he, in 1650, went over to the Reformed Church, but not finding himself so comfortable as he expected, he thought he had received a call to found an apostolic church for himself. He now became a preacher in Montauban, and afterwards, on being obliged to leave it, in the town of Orange, from which he proceeded successively to Geneva, Middleburg, and Amsterdam. In the last city he collected his followers into a distinct church or society under the name of Labadists. Toleration being now denied him, he in 1670 proceeded to Herford, where the Palgravine Elizabeth gave him protection. Driven thence by an imperial edict in 1672, he went first to Bremen, and finally to Altona, where he held private meetings, and died in 1674.

LABARUM, the name (of unknown origin) given from the time of Constantine to the imperial banner. Eusebius has described it with much particularity. It was in the form of a long pike, crossed at a certain height by a beam, from which depended a banner richly embroidered with gold, and adorned with precious stones. The pike was surmounted by a crown of gold, inclosing within it a monogram of the two initial letters of the name of Christ. According to the legend Constantine adopted this ensign in consequence of a dream which he had while marching against Maxentius, in which he saw the sign of the cross with the inscription, *En toutō nika* (In this conquer). 'As soon as it was day,' Eusebius says, 'he arose and declared the whole secret to his friends. Then he called together the workers in gold and precious stones, in the midst of whom he himself sat, and gave them a description of that standard, and ordered them to express its likeness in gold and precious stones, which standard we ourselves also happened some time to have a sight of.'

LABAT, JEAN BAPTISTE, a Dominican missionary and traveller, born at Paris in 1663, took the vows at the age of nineteen. He afterwards taught mathematics and philosophy at Nancy, where at the same time he performed the duties of a preacher. In 1693 he went out as a missionary to the French Antilles. He landed at Martinique in 1694, and immediately undertook the care of the parish of Macouba, which he superintended for two years, after which he was sent to Guadaloupe for the purpose of building a mill on an estate possessed by the order to which he belonged. His mathematical knowledge recommended him to the governor there, whom he accompanied during a tour through the island to assist him in selecting the points best adapted for works of defence. On his return to Martinique Labat found his cure occupied by another, and he received the office of *procureur-général* of the mission, in which an opportunity was afforded him of displaying the whole extent of his useful activity, at the same time that he served the government by his mathematical knowledge. During several voyages in the service of the mission he visited all the Antilles, and on the attack of Guadaloupe by the English in 1703 he rendered his countrymen important services as an engineer. In 1705 he was sent to Europe on business of the order, and landing at Cadiz, he embraced the opportunity to survey, geometrically and scientifically, the environs and the whole coast of Andalusia as far as Gibraltar. He likewise went to Italy, and finally returned to Paris in 1716, where he occupied himself with the publication of a part of his works, and where he died Jan. 6, 1738. His Nouveau Voyage aux Iles de l'Amérique, of which several editions have appeared, and which has been translated into several languages, contains an account of the natural history, particularly of some of the smaller and less frequented islands; of their productions; the origin, customs, religion, and governments of the inhabitants, as well as the chief political events which occurred during the author's residence there. He also published a Nouvelle relation de l'Afrique occidentale; Voyage en Espagne et Italie; Relation historique de l'Ethiopie occidentale; Mémoires du chevalier d'Arvieu.

LABÉDOYÈRE, CHARLES ANGÉLIQUE HUCHET, COMTE DE, of an ancient family in Bretagne, was born in Paris in 1786, entered the army in his twentieth year, and in 1808, when in Spain as aide-de-

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camp of Marshal Lannes, was severely wounded at Tudela. After his recovery he joined the army in Germany, distinguished himself at the taking of Ratisbon, received a fresh wound at the battle of Esslingen, and was attached to Prince Eugène in the same quality of aide-de-camp. The campaigns of 1812 and 1813 gave him new opportunities of distinguishing himself. Having been severely wounded at the battle of Goldberg, in 1813, he was not in active service at Napoleon's abdication, but returned to it under the Bourbons, and was with his regiment near Vizelle when Bonaparte returned from Elba. He immediately joined him, made his public entrance with him into Grenoble, and a few days after was rewarded with the rank of maréchal-de-camp. Shortly after he was appointed lieutenant-general, and made a peer of France. After the battle of Waterloo, where he fought with great courage, he hurried to Paris, and there distinguished himself in the stormy sitting of the chamber of peers, on 22d June, by his hostility to the Bourbons. On the capitulation of Paris he followed the army behind the Loire. Having determined to emigrate, he returned once more to Paris in order to take leave of his family, but was immediately apprehended and brought before a court-martial. His defence, though conducted with great spirit, was unavailing, and he was sentenced to be shot (August 15, 1815). On appeal the sentence was confirmed, and on the 19th of August was carried into execution. His handsome person and chivalrous demeanour excited great interest in his favour, and this interest was heightened by a general conviction that the sentence pronounced was in direct violation of an article in the capitulation of Paris.

LABIALS are letters chiefly pronounced by the lips, as *b*, *p*, *f*, *m*.

LABIATÆ, a natural order of dicotyledonous monopetalous plants, generally herbaceous, but sometimes shrubby, with square stems and simple and opposite leaves. Their most characteristic features are a two-lipped monopetalous corolla, four didynamous stamens, though the upper two are sometimes wanting, and a four-lobed ovary. The fruit consists of from one to four small nuts, inclosed in the persistent calyx, and the seeds are erect, with little or no albumen. These plants have no deleterious properties, but are for the most part aromatic and fragrant. They include sage, rosemary, lavender, mint, thyme, marjoram, basil, and similar herbs, cultivated for culinary, tonic, or aromatic purposes. The aromatic principle so generally characteristic of them depends on the volatile oil which their leaves contain in greater or less quantity: this oil is abundant in thyme, lavender, rosemary, and the various species of *Mentha*. Some species, however, are very little aromatic, and contain a resinous gummy matter which gives them a very decided bitter taste. Most frequently the bitter and aromatic principles are found in equal proportions, so that the medical action of the plants depends as much on the one as on the other. They exercise a special action on the respiratory apparatus, and are found useful as stimulants, particularly in chronic catarrhs. In such affections infusions of hyssop are often used with advantage. The leaves of rosemary are employed in medicine, and an extract of this plant is used by perfumers for promoting the growth of the hair.

LABIUM, applied in comparative anatomy to the appendage of the lower part of the mouth in Arthropoda, composed frequently of a pair of coalescent jaws or maxillæ, and known as the 'lower lip.' The lower portion of the labium is known as the *mentum* or *chin*, the upper part being termed the *ligula*. This latter portion in some forms (for example, certain insects) becomes developed to form a kind of *lingua* or *tongue*. The labium generally bears a pair of tactile organs, known as the *labial palpi*.

LABLACHE, Luigi, a celebrated basso singer, was born on 6th December, 1794, in Naples, where his father, a French merchant from Marseilles, had settled. The latter having died, Lablache was, when twelve years of age, under the recommendation of Joseph Bonaparte, placed in a musical conservatory at Naples, where he rendered himself somewhat conspicuous by his idle and unruly disposition, which prompted him frequently to run away and engage himself to some minor theatre. He was, however, compelled to finish his studies, and in 1812 made his *début* as a buffo singer at the theatre of San Carlino. After various appearances in Naples, Messina, and Palermo, he performed in Rossini's Cenerentola in La Scala Theatre at Milan, and established for himself the reputation of the first basso singer of the day. In 1824 he made his first appearance in Vienna, where he was received with equal enthusiasm, and in 1830 visited Paris and London. In 1852 he appeared at St. Petersburg, and was appointed private singer to the emperor, and made a knight of St. Andrew in 1857. Among the multitude of characters assumed by him may be mentioned more especially those of Don Pasquale in the opera of that name, Leporello in Don Giovanni, and Dr. Dulcamara in L'Elisir d'Amore. In physique he was a perfect colossus, with the head, as has been remarked, of a Jupiter, the figure of a Milo, and the voice of a Boanerges. This last organ was unsurpassed for magnificent sonorousness, flexibility, and compass, and his dramatic were no less conspicuous than his vocal talents. In private life he was much esteemed for his social virtues and accomplishments. He died at Naples on 23d January, 1858. His only daughter married Thalberg, the eminent pianist.

LABORATORY, Chemical, a workshop designed for chemical investigation and instruction. The size and arrangements are of course regulated by the requirements of the chemist, some being designed for special researches and analyses, while others are quite general. To the former belong the laboratories which are attached to dyeing, alkali, pigment, iron, copper, nickel, electro-metallurgical, and similar works. Laboratories are also attached to mining and metallurgical schools, to the mint, to the inland revenue office, to arsenals, and all these, while embracing of necessity arrangements common to all laboratories, are distinguished by others which are applicable to the particular lines of analysis therein pursued. A general laboratory, such as might be attached to a polytechnic school or university, has, however, to include all these specialties, partly because the whole science and its applications have to be taken into account and exhibited, partly because students with very different aims frequent such places. Hence the laboratories which have sprung up of late years, especially in Germany, are characterized by their size and their completeness, and are altogether different from those of an earlier period. In the middle ages they were to be found attached to the monasteries and apothecaries' shops, in the houses of the princes and nobles who endeavoured to get the philosopher's stone, and in the cellars of the alchemists. The furniture of such places, which were as dark and mysterious as possible, partly for the sake of secrecy, partly to awe those who might visit the worker, consisted chiefly of furnaces for different degrees of heat, of sand-baths and water-baths, of crucibles, cupels, muffles, retorts, stills, flasks, and bottles. There was no refined apparatus, and even down to the beginning of the present century much of it continued uncouth and

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coarse. One of the earliest descriptions of a laboratory and its requirements is contained in the commentary of Libavius, entitled De Sceuastica Artis. He gives sketches of the exterior of the building, a plan of the interior with its laboratory proper, museum, chemical store, rooms for different operations, sleeping apartments, garden, and even wine-cellar. Whether so elaborate a scheme was realized about 300 years ago may be doubted. A hundred years later there seems to have been a laboratory at Marburg, but unfortunately nothing is known about it, and so late as 1788 a request for an independent establishment was presented to the university there by the then lecturer. During the present century an excellent laboratory has been erected there, an account of which has been published by Kolbe. Up to between 1820–30 all the laboratories had been designed mainly for the use of one or two persons, who made the preparations for public lectures, or who were engaged in scientific investigation. Such was the laboratory of the Royal Institution in London when Davy made his great discoveries. It consisted of one principal room, not very well lighted, round the sides of which were cupboards and shelves for bottles and apparatus, while in niches were furnaces and sand-baths. In the centre stood a table with a pneumatic trough and other apparatus. On one side the laboratory opened upon the lecture-room. Upon this model other laboratories were designed, and drawings of these are given in some of the older chemical treatises. As the science progressed, however, the mode of teaching it altered. Lectures soon became insufficient, and it gradually became the custom for the students themselves to enter the laboratory and study the subject practically under the eye of the chief chemist. This method, in the course of fifty years, has become the principal one, and there are not wanting those who at the present day assert the absolute worthlessness of lectures.

The practical result has, however, been important so far as laboratories are concerned, for buildings have been constructed capable of accommodating fifty and even many more persons. The more important of these are at Bonn, Berlin, Leipzig, Marburg, as already mentioned, Wiesbaden, and Aix-la-Chapelle. The large ones consist of many rooms, according to the operations required. The principal departments are those where the students are engaged in ordinary qualitative and quantitative analyses, but there are besides apartments for the analysis of waters, of gases, for spectroscopic and other optical work, furnace rooms for analysis by the dry method—while to these are attached smaller balance and apparatus rooms, and rooms with abundant ventilation for the conduct of operations accompanied by the evolution of noxious vapours, &c. Every more recently constructed laboratory aims at greater perfection and concentration of arrangement, more thorough ventilation, and more conveniences for work, such as constant supplies of steam, of oxygen, of sulphuretted hydrogen and other gases, means of increasing pressure or producing a vacuum, all of which are refinements undreamed of in the early days of the present century, when a chemist had to make everything, even the sulphuric acid he required. Some of the new laboratories in Great Britain, as those of Owen's College, Manchester, and of the Science and Art Department, South Kensington, are among the finest institutions of the kind in Europe.

LABORATORY, PHYSICAL, a building devoted to original research and practical teaching in physics. In an *observatory* natural phenomena are merely observed accurately; now in almost every phenomenon of the material world we are concerned with a variety of causes, the effects of which interfere with one another; therefore, in investigating the effect of any one cause it is necessary by *experiment* to reduce the effects of all other causes so that they may be neglected; this is the work of a laboratory. All institutions where physics is taught have a lecture room and one or more smaller rooms in which apparatus is kept. The lecture room is provided with supplies of gas and water, steady tables, beams, &c., for suspending apparatus, window shutters for shutting out the light, and means of exhibiting diagrams. It is becoming more and more evident that the litter and dust of a lecture room, and the necessity for moving about apparatus, necessitate the use of separate rooms in original research; and as the arrangements which are necessary for research in one department of physics may be obstructions in other departments, there must be a number of separate rooms. Some of the public schools (Clifton College, for instance) are provided with small laboratories, and those of the Royal Institution, Glasgow University, King's College, London, and the universities of Oxford and Cambridge are calculated to have a great influence on English science. The Cavendish laboratory of Cambridge, the arrangements of which we proceed to describe, was designed by Professor Clerk Maxwell. The external walls are nearly all of brick, 2 feet thick; the foundations are 15 feet deep. Every window has two broad stone sills, one outside and one inside, on which instruments (heliostats, &c.) may be placed; there are well fitting window-shutters all over the building. All the tables are steady, being quite independent of the floors. Hatches are cut in the second floor, vertically over similar ones in the first. All the rooms are heated by hot-water pipes. There is a tower 59 feet high; on the top of it is a Bunsen's water pump, from which the water has a fall of 50 feet, and may be employed to exhaust a large vessel from which tubes pass to the different rooms, so that a vessel may be exhausted by connecting it with these tubes; a manometric tube on the tower communicates with the heat room; a wooden mast and metallic rod for atmospheric electricity communicate through an insulated wire with an electroscope in the electricity room. On the ground floor are:—The *magnetic* room, for observations requiring great steadiness; it is provided with three pillars, which have foundations separate from the rest of the building; the stone slabs on these pillars are 4 feet square and are 18 inches from the floor; at present the B. A. electrodynamometer and a unifilar magnetometer, as at Kew, occupy two of the pillars; three mirrors in the magnetic room, and a fourth in the heat room, give the direction of the meridian, &c. The *clock* room: the principal clock rests on a firm pillar, it is in electric communication with the other clocks in the building, it is sometimes compared with the astronomical observatory clock; a second pillar supports an experimental pendulum. The *balance* room: The *heat* room: The room where apparatus is unpacked, and from which a lift communicates to the second floor: The workshop, which has lathes, vices, and other tools: The *battery* room, in which are a large Thomson's Daniell's battery and a gas-holder for oxygen: apartments for the care-taker. On the first floor are:—The general laboratory, provided with twelve steady tables, a closet in which there is a good draught to a chimney, &c.: The professor's private room: The *apparatus* room, with glass cases, cupboards, &c.: The room in which experiments are prepared before lecture: The *lecture room*, which has special arrangements for rapidly closing the window shutters, beams for supporting pendulums, &c., and a long oak table, supported independently of the floor

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on a wall of the battery room. On the second floor are:—The *acoustics* room: The room where drawings and calculations are made: The *radiant heat* room: Two *optic* rooms: The *electricity* room, the air of which is kept dry by means of a heated copper roller and an endless band of flannel: A dark room for photography, &c. An insulated wire leads from an electric machine in the electricity room to the lecture room. A heliostat in a window of the electricity room may throw a beam of solar light 120 feet long to the acoustics room.

LABOUR. See BIRTH.

LABOUR, AND LABOURERS. The two great sources of income in all communities are labour and capital. The means of production are the land, utensils, stock, and all which constitutes capital, and the labourers who use this capital. In this general division of the means of production the term *labour* is used in its broadest sense, for the labour of the mind, or that of the artist, which depends more upon skill than muscular exertion, is to be included in the general estimate of the productive power if a price or market value is put upon its products in the general estimate. Nor should we, in estimating the general productive capacity, confine ourselves to the species of labour which results in the production of articles of necessity or convenience merely, since, in the products consumed by any community, it is not practicable to draw a distinction between articles of mere utility and those of taste, utility and luxury being combined in a great part of the things used or consumed by a people, whatever may be its stage of civilization and refinement. The land and the greater part of the utensils of production are estimated, it is true, in a great degree, and in many instances wholly, by their mere utility for production. But it is otherwise with respect to the products intended not merely as the means of producing others but as ultimate objects of use or consumption. Dwellings, furniture, clothing, food, all combine, in different degrees and proportions, both luxury and utility. The quantity of wool and cotton worn and used by two persons in different ranks of life and of different means of consumption may be the same and answer equally well as a protection of the person against the climate; and yet that used by one, owing to the better quality of the material and the greater labour bestowed in fabricating it, may cost three or ten times as much as that used by the other; and yet something is paid to taste and luxury even by this latter. The mere utility of any article is of difficult estimation, and though it is a proper subject of inquiry and speculation, still, in estimating the productive power of labour in comparison with capital, the more practical rule seems to be to take the estimate put upon it by the community itself. If, for instance, the labour of a sculptor is, in the estimation of a community, worth that of twenty day-labourers, the distribution of the annual products of the labour and capital of that community will be governed by this rule of comparison, and the sculptor will be able to consume as much in value as the twenty common labourers. Hence the proportion of the income of labour and capital will vary in different communities, according to the different arts or kinds of production encouraged. To take the same examples, though the labour of a sculptor may be equal in value, as estimated by a community, to that of twenty labourers—and the same may be equally true of the painter—yet the capital or stock required for each of these twenty labourers may be greater than is required for either of those artists. The proportion then of the value of the whole capital of a community to that of the whole estimated annual value of the labour of all sorts performed by its members will depend upon the kind of arts pursued, so that the proportions will not be uniform in different communities. A rapid change may be made in the wealth of a community, either for the better or the worse, by an impulse or check to its industry, or a general tendency to economy or prodigality in consumption. The arts and employments and habits of a people are everything in respect to their prosperity; and the actual amount of their present capital is of less importance, since, if it be too small, that is, if the people are in want of a sufficient stock to employ themselves to the greatest advantage, industry and economy may very soon supply the deficiency. The aggregate annual products of the same labour and capital are greater in one country than another. This is a distinction of great importance, which is overlooked in some economical speculations, or which, at least, has not always its just weight. The fact is perhaps too obvious to need proof or illustration. If, for instance, the people of one country have better lands, domestic animals, roads, utensils, or are more skilful and ingenious than those of another, the same amount of manual labour bestowed upon corresponding materials, with corresponding instruments of production, will produce greater results. The wages of labour and the interest of money may both therefore be higher in one country than in another. It does not follow then that if the condition of the mere labourer is better in one country than in another that of the capitalist will necessarily be worse. To ascertain the condition of these two classes, possessing between them the productive capacity and means of a community, we first inquire into the aggregate productiveness of capital and industry, and next into the distribution of the aggregate products between the two classes. And in examining into the condition of the members of a community the next inquiry relates to the proportionate share of each industrious class in the whole portion of the aggregate products allotted to industry as distinguished from that which is allotted to capital. This distribution among the labouring classes themselves of the products of their labour will of course depend upon the estimation in which the various kinds of labour are held; and its effect on their condition will also depend very materially upon the arrangements, improvements, and facilities possessed by the community to render their labour effective, for the compensation to labourers individually may be small, and yet the expense of the whole class of the community to which they belong very great. To take a familiar instance: if, from the thinness of the population, or other cause, the receivers and distributors of the articles of production and consumption among the people, that is, the retail dealers, can transact but a small amount of business each, though the earnings of each one may be small, their aggregate compensation must be large. In countries half civilized, and in which the arrangements and facilities for exchanges are rude and imperfect, the usual profits of trade are at an enormous rate per cent.; and yet the wealth of these traders will be very trifling in comparison with that of the merchants and traders of a more civilized, improved, and populous community, though the per centage of profit of these latter may be much lower. The same distinction will hold good in respect to every other pursuit and employment in a community—the proportion of the whole products awarded to any one class may not correspond at all to the individual advantage or disadvantage of the members of that class in their pursuits in comparison with that of those of any other class. The compensation of any one class of a community in comparison to any other will evidently depend upon the course taken by the taste and luxury of the community, for we may

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assume it as a general doctrine that when the taste and passions of a community lead to a large consumption of the articles produced by any class, or if the services of its members are considered particularly beneficial, these members will be liberally compensated. The effect will not, however, necessarily extend itself to all the members of the class. Suppose, for example, that the taste and vanity of a people appear very much in their apparel and personal ornaments, it will not follow that all clothmakers, tailors, jewellers, hatters, and shoemakers will have the highest wages in the community, but the result will be that a high price will be paid for excellence of material or superiority of skill in the manufacture of those articles. The moment therefore in which civilization commences—and some degree of it is coeval with the existence of every society—excellence in some arts or employments will meet with extraordinary rewards. As arts and civilization advance the objects of passion and taste will be multiplied, and with them the kinds and varieties of excellence of materials or skill which will be esteemed of extraordinary value. The effect necessarily is to produce a comparative depression in the value of all ordinary products and unskilful labour. Accordingly the ordinary labourers in all the arts become by degrees a distinct class. In a refined community abounding in arts this class necessarily becomes numerous, and the condition of its members is a subject of solicitude to the philanthropist and of interest to the economist and statesman. The security and welfare of the whole community will depend very materially upon the character and condition of this part of the population. The greater the distance between this class and the rest, the more effectually they are set off from the others, the more unnatural and distorted will be the state of society, and the more frequent will be scenes of disorder, distress, and vice. It is one of the first and most important maxims of policy and of economy then to sustain the members of this class by using all possible means, whether by legislation or social influence, to give them education, good habits, and good morals; to foster in them a spirit of enlightened independence, and thus inspire and maintain in them a respect for themselves and secure to them the respect of others.

LABRADOR, an extensive peninsula on the east coast of British North America; lat. from 50° to 65° N., and lon. 56° to 78° W.; bounded south-east and east by the Gulf of St. Lawrence and the Atlantic, on the north and west by Hudson's Strait and Hudson's Bay, and on the south-west by Rupert's River, Lake Mistassini, and Bersamits or Bersiamits River; extreme length, 1100 miles; breadth, 470 miles; area estimated at 450,000 square miles. The interior is very imperfectly known. The table-land is 2240 feet above the sea-level; is pre-eminently sterile; and is in some places covered with boulders three and four deep. The Wotchish Mountains form the principal water-shed, sending the waters west, north, and east. There are numerous lakes, as almost every river forms several during its course by expanding. Granite, gneiss, and mica-slate are the prevailing rocks, in some places covered by a thick bed of old red sandstone, followed by secondary limestone. During summer deer, bears, wolves, foxes, martens, and other animals frequent the valleys where the stunted trees of the peninsula are found till winter drives them to the coast. Caribou or rein-deer, once numerous, are now comparatively few. No ordinary cereal can ripen in the climate, though barley cut green makes excellent fodder, and potatoes and some culinary vegetables can be grown. Civilized man is found at a few settlements on the St. Lawrence and Atlantic coasts, and at some widely separated posts of the Hudson's Bay Company. The natives of the northern coast are Esquimaux, while some tribes of nomadic Indians are thinly scattered over the interior. The Indians of the interior are all tribes of the once great Algonquin race, and could at one time bring 1000 warriors to repel the incursions of the Esquimaux, whom they still bitterly hate. The Esquimaux live almost entirely by fishing. They are mild, hospitable, and honest, and well provided with wolf-like dogs, which can draw them over the snow in sledges at the rate of from 6 to 10 miles an hour. During the brief summer the coasts swarm with fishing boats from Newfoundland, Quebec, Nova Scotia, and the United States, the total value of these fisheries being said to be not less than £1,000,000. The exports are cod-fish, salmon, furs, and seal and whale oil. Labrador was discovered by Cabot in 1496, and rediscovered by Hudson in 1610. The population is supposed to be about 5000. Captain Cook first displayed his abilities as a marine surveyor on the coast of Labrador.

LABRADORITE. This mineral is a variety of felspar, and belongs to the anorthite or lime-felspar group. It crystallizes in triclinic prisms, occurs in twins and also in masses with a more or less granular or crystalline appearance. Its hardness is about 6; specific gravity from 2·67 to 2·76; it fuses with difficulty before the blowpipe, and is decomposed by strong hydrochloric acid; in this respect it differs from ordinary felspars. It was first distinguished by the Rev. Mr. Latrobe, among a number of specimens sent to him from Labrador by the Moravian missionaries, about 1770. It occurs not only in pebbles on the shore, but in spots in the rocks about Nain, and particularly near a lagoon about 50 or 60 miles inland. Its colours, darting through the limpid crystal of the lake, and flashing from the cliffs, more especially when moistened by a shower of rain, changing continually with every alteration in the position of the spectator, are described as almost realizing a scene in fairyland. Since then it has been met with in a great number of localities—the Harz, Tyrol, Norway, Russia, Greece, Italy, &c. &c. In this country it is found in the Campsie Hills, near Glasgow; in Ireland, in the Mourne Mountains and in Galway. This variety of felspar consists of silicate of sodium and calcium with silicate of aluminium, and contains smaller quantities of iron, potash, magnesia, and water. Its composition is—silica, 50·31 to 55·83; alumina, 25·3 to 30·03; lime, 7·47 to 15·14; soda, 1·25 to 6·66; iron, 0·03 to 4·5; magnesia, 0·18 to 1·74; potash, 0·23 to 3·4; water, 0·5 to 2·97. The colour of common labradorite is gray or brown, but it is specially distinguished by very frequently exhibiting a beautiful opalescent or iridescent play of colours. Blue and green are the most common colours, but occasionally these are intermingled with rich flame-coloured tints. It is sawed into slabs by the lapidaries, and employed in inlaid work. The finest pieces are very highly esteemed. A square table, composed of two pieces of this stone, the dimensions of which were 13 inches by 20, and 8 lines in thickness, was sold in Paris for £70 sterling.

LABRIDÆ (= *Cyclolabridæ*), a family of fishes belonging to the order Teleostei, and included in the suborder Acanthopteri of that order. The Labridæ or Wrasses possess prominent fleshy lips, rendering the mouth protrusible. The scales are large, and of the cycloid or common variety. The teeth are strong, and in some genera of the family (for example, *Scarus* or *Parrot-fishes*) the jaws form a beak-like conformation, covered by the tooth-structure. The pyloric cæca are absent in this family. The lower or inferior pharyngeal bones are united. The Labridæ possess a wide distribution, the family being represented in almost every sea. The coloration of the body is

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generally of the most vivid kind. The Wrasses feed chiefly upon Crustaceans. In habits they are essential rock-fish, that is, they are generally to be found concealed under the clefts and among the sea-weeds which fringe the rocks. The flesh is coarse and rarely eaten. The *Labrus maculatus* or Ballan Wrasse may be cited as a familiar species. Its average length is from 12 to 16 inches. The Blue-striped Wrasse (*L. variegatus*) has a body-colour of orange, striped with blue. The back is tinged of a reddish hue, the belly being yellow. The Green and Red Wrasses are regarded as mere varieties of the common species (*L. communis*).

LABRUM, the 'upper lip' of Arthropoda (Insects, Centipedes, Crustaceans, Spiders, &c.), situated on the upper part of the head, and bounding the mouth superiorly. The labrum undergoes little change or modification throughout the various groups of Arthropoda, and is destitute of *palpi* or organs of touch, such as are borne by the *labium* or lower lip (which see).

LABRUYÈRE, Jean de. See Bruyère.

LABUAN, or Labooan, an island in the Indian Archipelago, belonging to Britain, off the north-west coast of Borneo, at the entrance to the Bay of Borneo; lat. (west point) 5° 15′ 6″ N.; lon. 115° 7′ E. It is of triangular shape, the apex to the north, and is about 11 miles in greatest length, by 7 miles in greatest breadth; area, 45 square miles. It is well supplied with water, and has a good harbour at the settlement of Victoria, on its south-east side. Coal of excellent quality is plentiful, and has been mined for more than twenty years, but hitherto with indifferent success. The fourth in succession of the mining companies which have attempted to work the mines were compelled to bring their operations to an end in 1879. The clean cost when raised about 72*s.* per ton, while it could only command a price of 25*s.* to 30*s.* per ton. Want of machinery strong enough to pump the workings dry is stated to have mainly contributed to bring about the collapse. For 1881 the revenue of the island was £4589, and the expenditure £6449. The chief trade is with the coast of Borneo. The imports during the year amounted to £178,828; the exports to £187,108. The total shipping entered and cleared was 11,385 tons. In addition to coal, ironstone, freestone, and petroleum are also obtained. Various smaller islands fringe the south shore and stretch out south-east and south-west from Labuan, and the channels between them are often encumbered with coral-reefs. This island was taken possession of by the British in 1846. Pop. (1881), 5883.

LABURNUM (*Cytisus Laburnum*), natural order Leguminosæ, an ornamental shrub much planted in pleasure-grounds on account of its glossy and beautifully formed leaves, which are composed of small oval leaflets, and its graceful dependent racemes of beautiful yellow flowers, which come forth in great abundance in May and June. The wood of the tree laburnum (*Cytisus alpinus*) is much prized by cabinet-makers and turners for its hard, compact, and durable structure. Hares and rabbits are so fond of the bark of this species, that it is frequently planted on the outskirts of other plantations to protect the more valuable trees. Though eaten to the ground in winter it will spring again next season, and thus afford a constant supply for these animals, so as to save the other trees, till they attain a size sufficient to enable them to resist their attacks. The wood is used for many purposes, as wedges, pulleys, pegs, handles of knives, and other instruments. Many of the purposes for which it was once used are now supplied by lignum vitæ. The seeds of the laburnum are possessed of narcotic and poisonous qualities, and it is said that if a garland of the flowers be worn around the neck it produces headache. The narcotic and poisonous effects are produced by *Cytisine*, a principle found also in many allied plants. The purple-flowered and winged-leaved species are very handsome ornamental shrubs, and are frequently ingrafted on stocks of the common laburnum.

LABYRINTH, with the ancients, a building containing such a number of chambers and galleries, one running into the other, as to make it very difficult to find the way through it. The Egyptian labyrinth, the most famous of all, was situated in Central Egypt, above Lake Mœris, not far from Crocodilopolis (Arsinoe), near the pyramid of Biakhmu, in the district now called Faioum. Its construction has been attributed to various persons, but researches on the spot have shown that part of the structure was built by Amenemhe III. about 2100 B.C., and it is believed that the portion more particularly known as the Labyrinth was built as late as the seventh century B.C. by the Dodecarchs or twelve contemporaneous kings, as stated by Herodotus. The building, half above and half below the ground, was one of the finest in the world, and is reported to have contained 3000 rooms, the arrangement of which seems to have been symbolic of the zodiac and solar system. The passages were so intricate that no stranger could find the way without a guide. It is said that in the lower rooms the coffins of the builders of this immense fabric, and of the sacred crocodiles were deposited, and that the upper rooms excelled in splendour and art all human works. Respecting the interior construction and the destination of the labyrinth of Crete we know still less. The ancient writers consider this subterranean cavern to have been built by Dædalus in imitation of that of Egypt, but on a smaller scale, by order of Minos, who confined there the Minotaur. According to others it was a temple of the latter. Its existence was probably suggested by traditions connected with an extensive cavern near Cnossus, still locally known as the Labyrinth. The labyrinth at Clusium was erected by the Etruscans, according to Varro, for the sepulchre of King Porsenna. It was a square building of stone, 50 feet in height, and 30 on each side At each corner stood a pyramid, and also one in the centre, each 150 feet high, and at the base 75 feet wide. But as it was undiscoverable in the time of Pliny its existence is problematical. There were other labyrinths at Lemnos and Samos, but their sites are unknown. These edifices were not built for the purpose of making people lose their way; this was merely an accidental peculiarity, on account of which every confused mass of things, difficult to be disentangled, has been called a labyrinth. Imitations of labyrinths, called mazes, were once fashionable in gardening. They were made of hedges of privet, or some similar shrub. The best known is that at Hampton Court.

LABYRINTHODON, the name of an extinct genus of amphibian animals, the fossil remains of which occur chiefly in the Triassic rocks, but which extend in time from the Carboniferous to the Triassic system. Several species are known to palæontologists. The Labyrinthodons were all of large size, some being even gigantic. The head of one species (*L. Jagœri*) measures upwards of a yard in length, and is about 2 feet in breadth; whilst other species attain similar or nearly equal proportions. These forms were first discovered through their footprints, which were found in the Triassic rocks long before the actual fossilized remains were brought to light. The footprints were described at first as those of a hypothetical form, to which the name of *Cheirotherium* ('hand-beast') was given. As geological

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science and research progressed, the remains of the Labyrinthodons were discovered, when a comparison of their structure with the footprints at once showed that the actual Labyrinthodon and the theoretical Cheirotherium were one and the same form. And the present gives a remarkably good example of how true a deduction palæontology, assisted by comparative anatomy, may make. The footprints of the Cheirotherium thus afforded a clue to the structure of the animal which had made them; and from this clue a hypothetical form was constructed, which was found to correspond closely with the actual Labyrinthodon when the latter form was discovered. The Labyrinthodonts present features of interest to the naturalist, as differing in many and important respects from existing amphibians (frogs, newts, &c.) Thus the head and upper regions of the body were protected by external bony plates, those of the head being sculptured on their outside surfaces, and possessing grooved canals, known as 'mucous canals.' In existing amphibians an external body-covering of scales is generally wanting, or is at most rudimentary. The teeth of the Labyrinthodon have given to the order its name, since they exhibit on section a peculiar labyrinthine pattern or folding of their outer walls. In no recent amphibian do the teeth reach the perfection of structure exhibited by those of the Labyrinthodonts. These forms possessed weak limbs, the hind-limbs being relatively the larger. They possessed a tail, and thus their nearest representatives among existing amphibians are the Urodela or Tailed Amphibians (for example, newts, sirens, axolotl, &c.)

LAC, or LAK, from the Sanskrit *lakshá* or *laksha*, that is, 100,000. In the East Indies it is applied to the computation of money. Thus, a lac of rupees is 100,000. A lac of Company's rupees was equal to about £9270, the rupee being 1*s.* 10½*d.* A lac of Sicca rupees was equal to £9898, the Sicca rupee being sixteen-fifteenths of the Company's rupee. 100 lacs, or 10,000,000 of rupees, make a *crore*. In 1835 the government remodelled the currency of India, establishing a more uniform system, and the value of the rupee was fixed at 2*s.*

LAC, LAK, LAAK, and LAK'H, are different ways of spelling the vulgar derivatives from the Sanskrit words *lakshá* and *laksha*, that is, one hundred thousand; a name given by the Hindus to the *Coccus lacca* and *gum-lac*, for which they have six different terms; 'but they generally call it *laksha*,' says Sir William Jones, 'from the multitude of small insects which, as they believe, discharge it from their stomachs, and at length destroy the tree on which they form their colonies.' The lac, however, seems to come from the trees upon which the insect settles, the exudation being fashioned into highly symmetrical cells inside, and serving as a protection for the eggs. The trees which are infested by this insect, which closely resembles cochineal, are the Indian and Banyan fig, *Rhamnus jujuba*, *Croton lacciferum*, &c., found in different parts of the East Indies. When the deposit is ready, and before the young insects make their appearance, the twigs with the red resinous deposit are broken off, and constitute the *stick-lac* of commerce. If the deposit be broken off from the twigs, so as to form a granular powder, it constitutes *seed-lac*. The lac is purified by being heated in long narrow bags until it is fluid enough to pass through, when it is allowed to cool in masses or thin cakes, forming *lump* and *shell lac*. The chief difference between these varieties is the amount of the red colouring matter of the insect which they contain, the stick-lac being richest. Shell-lac, which is the most familiar form, is of an amber-yellow colour, somewhat resinous, hard, moderately brittle, fusible, and soluble in spirit. It is largely used in the manufacture of hats, of sealing-wax, and of different kinds of varnish and cements. Mixed with fine sand, and sometimes with emery, it is used by lapidaries for cutting and polishing stones. It is insoluble in water, but is taken up by alkaline liquids, and especially by a solution of borax, and this solution is sometimes used in water-colour painting.

The colouring matter of the stick-lac comes, as already said, from the insect, and resembles the colour of cochineal. It is largely used in the East for dyeing silk and wool, and the beautiful red Turkey morocco is said to owe its colour to the same matter. The stick-lac itself is used, being dissolved in an alkali; but there are also preparations of the colouring matter, the intention being to get rid of the excess of resinous substance. The more important of these are lac-dye and lac-lake. The former consists of the colouring matter extracted by water and evaporated to dryness. It is got in small cakes 2 or 2½ inches square, by about ½ inch thick, which have a red or grayish crust, and when broken present a brownish-black interior. The dye contains a certain proportion of resin, which necessitates the use of an acid to dissolve it, sulphuric or hydrochloric being usually preferred, and the dye so prepared is mordanted with tin. The qualities of lac-dye imported vary very much, and are distinguished by different marks or brands. The dye comes from Calcutta in boxes holding from 160 to 300 lbs. weight each, and is said to amount to 1,000,000 lbs. per annum. The other preparation of the colour, called lac-lake, contains, as its name implies, the colouring matter in combination with a metallic oxide. The colour is exhausted from the stick-lac by means of soda, and to this solution alum is added. The precipitate which forms contains the colour, along with some resin. The precipitate is moulded into rough cubes, and dried. According to some, there is no difference of kind, but only one of quality, between lac-dye and lac-lake; but the other account seems more probable. The substance called *lacquer*, which is largely used to improve the appearance as well as to protect the surface of brass-work, is a solution of pale shell-lac in spirit, to which is added, for the purpose of giving the exact depth of tint required, a certain amount of red or yellow colour, such as dragon's-blood, annatto, saffron, &c. The object to be lacquered must first be heated to a proper temperature, and the lacquer, also warm, is brushed on. It is then allowed to cool. It thus differs from japanning, in which, after the lacquer has been applied, the object is heated to as high a temperature in a stove as it will stand.

LACAILLE, NICHOLAS LOUIS DE, an eminent mathematician and astronomer, was born at Rumigny, not far from Rheims, March 15, 1713, studied at the College at Lisieux, and wished to dedicate himself to the service of the church. But his attention was after a time directed to astronomy, and he soon renounced theology altogether. Cassini and Maraldi were his friends, and in conjunction with the latter he drew up a description of the coast of France from Nantes to Bayonne. On account of the accuracy and skill which he displayed in this operation he was selected to take part in the verification of the meridian, which was then beginning to be a subject of interest. He began this great work April 30, 1739, and in this year finished all the triangles from Paris to Perpignan, measured the bases of Bourges, Rhodez, and Arles; observed the azimuths and zenith distances of the stars at Bourges, Rhodez, and Perpignan, and took the principal share in the measurement of the degree of longitude which terminates at the harbour of Cette. During the winter of 1740

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he extended his triangles over the principal mountains of Auvergne, to connect with the meridian a new basis measured at Riom. The object of this excursion was to procure additional information for the purpose of clearing up the doubt which he entertained concerning the basis of Juvisy, measured by Picard in 1669. He had discovered and demonstrated that this basis was a thousandth part too long, from whence it followed that the toise used by Picard was at least a line shorter than the toise of the Academy. This assertion of his, so long contested, was now placed beyond doubt. During his absence he was made professor of mathematics in the College of Mazarin, in consequence of which the continuation of the meridian in the north was delayed till the next autumn. Lacaille ended his surveys in the course of some months, during which he measured two bases more, and made the astronomical observations at Paris and Dunkirk. After his return he commenced the calculations for which he had prepared the materials by these long operations, and by a comparison of the different arcs which he had measured he showed that the degrees increase from the equator to the poles, a result diametrically opposite to the old measurement. His works on geometry, mechanics, astronomy, and optics, which followed each other in a few years, show with what ability he discharged the duties of professor. His Ephemerides, and the numerous and able memoirs which he presented to the Academy of Sciences, and his calculations of the eclipses for 1800 years, in the first edition of his Art de vérifier les Dates, prove with what ardour he pursued his astronomical studies. He had undertaken the correction of the list of stars, according to the method of corresponding heights. In 1746 he was in possession of an observatory erected for him at the Collége Mazarin. True to the laborious method which he believed the best Lacaille spent his days and nights for fourteen years in making observations on the sun, the planets, and the stars, to rectify the astronomical catalogues and tables. Desirous of observing the stars of the southern hemisphere which never appear above the horizon at Paris, he formed the plan of a voyage to the Cape of Good Hope, whither he went in 1750. He saw immediately the advantage to be derived from this change of place in determining the parallax of the moon, of Mars, and Venus, and the refraction of the rays of light. Lalande, then nineteen years old, was sent to Berlin, which lies nearly under the same meridian as the Cape, to take corresponding measures at the same time. This astronomical undertaking cost four years of journeys and labour. Lacaille determined the position of about 10,000 stars in 127 nights with wonderful accuracy. As his departure from the Cape was delayed he employed the interval in measuring a degree of the southern hemisphere. After his return he divided his time between his observatory, his calculations, his duties as an academician and professor, and the publication of his different works. In 1757 appeared his Astronomiæ Fundamenta, the continuation of his Ephemerides. He made it a rule to admit no star into his new catalogue which he had not observed for three or four days, comparing it each time with several of those the places of which he had previously determined with extreme care. Engaged in so many employments Lacaille still found time for other labours. From the manuscripts of Bouguer he published Traité de la Gradation de la Lumière, and wholly revised the Traité de Navigation. He afterwards published the Observations of the Landgrave of Hesse-Cassel and Walther, the Travels of Chazelle to Egypt, and Feuillée's Voyage to the Canary Islands. A violent attack of the gout having interrupted his labours, he resumed them as soon as he was able with too much eagerness, exhausted his weak frame, and died 21st March, 1762. He bequeathed his manuscripts to his friend Maraldi, who published the Cœlum Australe Stelliferum, preceded by an *éloge* of the author by Brotier. The number, as well as the accuracy of his observations, is worthy of admiration, more particularly if we consider that all his astronomical labours took place within twenty-seven years. His Journal Historique du Voyage fait au Cap de Bonne Espérance was edited by Carlier (Paris, 1763).

LACCADIVE ISLES, a group of small coral islands in the Indian Ocean, about 150 miles off the coast of Malabar, extending from lat. 10° nearly to 12° N., and lon. 72° to 74° E. They form twenty separate reefs, containing, however, but 13 islands, only 8 of which are inhabited. The surface soil is naturally so barren that there is little or no spontaneous vegetation on the majority of the islands, and their prosperity must ever depend on the cultivation of the cocoa-nut, from the husks of which the inhabitants make coir cables, which are more elastic and durable than hemp. The islands are well supplied with fish, and export cowrie-shells, Coir, jaggery, betel-nut, plantains, a few eggs and poultry, and coral for conversion into lime, are the only other exports, and are of little importance. The natives of these islands, a race of Mohammedans called Moplas (of mixed Hindu and Arab descent), are a mild and inoffensive race and dwell in low, thatched, stone-built houses, and live poorly. Vasco de Gama discovered these islands in 1499. They were dependent on Cannanore till ceded by Tippoo with the rest of his dominions to the British in 1792. Pop. (1881), 11,287.

LACE, a delicate kind of net-work, formed of silk, flax, or cotton thread, used for the ornamenting of female dresses, and is made either by hand or machine, the former being produced by the needle, or made on the pillow. Its meshes are of a hexagonal or six-sided figure, and formed by twisting together the threads of the substances just mentioned. Thicker threads are also interwoven to form the figures or patterns according to some regular design, and these (called technically the *gimp*) form the ornaments of the lace. There are several different kinds of lace, which are more or less esteemed according to the fashion of the day, and valued in proportion to their rarity more than from any real difference in their quality and appearance. That of England is generally called after the several counties in which it is made. It is also called pillow or bobbin lace, from being woven upon a pillow or cushion by means of bobbins. It consists of hexagonal meshes, four of the sides of each mesh being formed by twisting two threads round each other, and the other two sides by the simple crossing of two threads over each other. This is the kind manufactured at Lille in France, and Nottingham in England. Another kind is made at Honiton in Devonshire, and called Honiton or Devon lace. It is of the same kind as that made at Brussels. Two sides of each mesh of this are plaited of four threads, and the four other sides by threads twisted together. The plaiting renders it much more durable than the twist lace, and it therefore bears a much higher price. There is also a third sort of lace manufactured at Valenciennes, but which is not made in England at all. In this all the six sides of the mesh are plaited, but two of the sides of each mesh are very small. At Nottingham imitations of lace are produced by machines, called point net and warp net, from the names of the machines in which they are made. They are both a species of chain work, and the machines are varieties of the stocking-frame. The

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warp frame makes a very close imitation of the Brussels lace, but it has very little durability. The Buckinghamshire lace is woven on a pillow or cushion, which the woman or child who makes the lace places on her knees. The threads are wound upon bobbins or small round pieces of wood, each about the size of a pencil, having round their upper ends a deep groove, so formed as to reduce the bobbin to a thin neck, and on which the thread is wound; a separate bobbin being used for each thread. To form the meshes pins are stuck into the cushion, and the threads are woven or twisted round the pins, a piece of parchment being first fixed down upon the cushion, pierced previously through with small pin holes in regular order to show the proper places for the pins; and on this parchment the design for the gimp is also traced, so that it may be interwoven with the finer threads and form the figures. The work is begun at the upper part of the cushion by tying the threads together in pairs, and each pair is then attached to a pin, which is stuck through the parchment into the cushion, the round form of which allows the threads to hang down and remain steadily on whichever side the bobbins are placed. The woman, taking one pair in each hand with her finger and thumb, twists the bobbins round each other three times, the effect of which is to twist the threads of each pair together, and this is done by both hands at the same instant of time. This twisting which forms the two sides of the mesh being completed, the adjacent bobbins of each pair are interchanged in order to cross the threads of those bobbins over each other, and thus form the bottom of the neck. Thus, for instance, supposing the bobbins numbered 1, 2, 3, and 4. No. 1 is twisted round 2, and 3 is twisted round 4. Then in order to cross 2 and 3 are interchanged, so that 1 and 3 come together, and 2 and 4; and the next time that the twisting operation is performed these pairs of threads will be combined together. When a mesh or half mesh is made it must be secured by putting a pin into the cushion, and in order to draw the twist-work close the pin is introduced between the recently crossed threads, and carried up towards the top of the pillow, so as to drive the twists and cross before it, and draw the twists into a closer compass. The pin is then inserted into its proper hole in the parchment, and will prevent the threads from returning. These four bobbins are now laid apart for the present on one side of the cushion, when two other pairs are brought forward in front, and twisted and crossed in the same manner; and in this way the work proceeds till a row of meshes is formed all across the breadth of the intended piece of lace, and then the same bobbins are worked over again to make another row. In general the number of bobbins is equal to fifty or sixty to each inch of breadth. These operations are performed with the greatest dexterity; but the work goes on very slowly, so many meshes being required for a very small piece of lace. Thus, taking the threads at 50 per inch, if the lace be one inch wide it will have 25 meshes in its breadth, or 625 meshes in each square inch of length, or 22,500 meshes in a yard.

The first attempt to employ machinery in the manufacture of lace appears to have been about 1768 by a stocking-weaver of Nottingham, of the name of Hammond, from studying the lace on his wife's cap. He contrived a modification of the stocking-frame by which an inferior description of lace, in imitation of that known as *Brussels ground*, was produced. Various other attempts in the same direction were made by different individuals about the same time, and a few years afterwards the *warp-frame*, for making *warp-lace*, was devised. The invention of this machine has been ascribed to four persons—Vandyke, a Dutchman; Mr. Clare, of Edmonton, near London; Mr. Marsh, Moorfields, London; and Mr. Morris, of Nottingham. By the aid of these machines lace, though of an inferior description, was produced in such abundance and at such prices as materially to affect the profits of the pillow-lace weavers or hand-workers. Nottingham became the centre of this new trade, which rapidly established itself as an important and successful manufacture. In extent and importance, however, it has been far eclipsed by the bobbin-net manufacture now to be described.

At the end of the last century the first attempt was made to produce bobbin-lace by machinery, but the result proved unsuccessful. For several years afterwards these experiments were renewed by various individuals, but all failed, till in 1809 a machine for making bobbin-lace was devised by Mr. Heathcote, of Tiverton, who took out a patent for his invention, and accomplished a complete revolution in the manufacture of this fabric. Many other patents for lace-making machines have subsequently been applied for and obtained; as those of Morley in 1811 and 1824, and those of Leaver and Turton, and of Clark and Marl, both in 1811. But though numerous modifications and improvements on the original design were introduced, the method pursued in the manufacture of bobbin-lace is still essentially that of Heathcote's machine. The following paragraph presents an account of the process.

In the bobbin-net machine the threads used for the warp are wound upon a roller at the bottom of the frame, and carried up to a work-beam or roller situated at the top of the machine. Those for the weft are wound upon small bobbins of a peculiar construction. Each bobbin is formed of two thin brass disks rivetted together so as to leave a groove in the periphery on which the thread is wound. In the centre is a hole which serves for passing a rod through to keep the bobbins steady during the process of filling from a sort of reel, called the bobbin-filling machine. The bobbin on being filled with thread is inserted into a small carriage or frame, which will turn round freely when the thread is drawn off, but guarded by a slight spring, so as to give some resistance and draw the thread tight. The longitudinal threads are stretched in a perpendicular direction from the thread to the lace-roller, forming a row of parallel threads, arranged equally distant from each other; and to guide them each thread is conducted through a small eye in a wire resembling a needle. Two rows of such guides are fixed on two bars, placed horizontally, each capable of a small side movement, so as to carry the threads along with them. On each side of these is a horizontal or *comb bar* (sometimes called a *bolt bar*), having its upper surface cut into grooves to receive the bobbin carriages. These run along the upper side, and across the length of the bar. Behind the row of threads is another comb-bar, precisely similar to that in front. The bobbin carriages can pass freely to and fro between these two comb-bars, but there is only such space between them as to allow them to enter the grooves of one while still playing in those of the other. By means of two thin bars or rollers the bobbin carriages are repeatedly moved backwards and forwards, and transferred alternately from the front to the back comb-bar, and in so doing pass between the perpendicular threads; at each transfer the bar sustaining the guides is moved sideways through a distance equal to the interval between the grooves of the combs, by which movement the perpendicular threads come to be placed alternately on each side of the moving bobbin carriages, so that a

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twist is made every time, and the sides of the meshes are thus formed.

The operations of drawing the twist close and giving the necessary form to the meshes is done by means of a row of sharp pin points, which are suspended in a frame so as to be brought down and introduced between the threads beneath the crossings, and being moved upwards the points carry the twists and crossings before them, draw them close, and give the requisite form.

The quality of bobbin-net lace depends on the smallness of the meshes, their equality in size, and the regularity with which their hexagonal shape is displayed. Its manufacture is carried on to a considerable extent in France, having been established by English workmen from Nottingham at Calais in 1817. Considerable quantities are likewise made at Cambray, Lille, St. Quentin, and Lyons.

From the return for factories and workshops in 1874, issued as a government blue-book in 1875, it appears that there were then 311 factories in England, containing 3462 lace machines, and employing 10,373 hands. Almost the whole of the factories were situated in the counties of Nottingham, Leicester, Derby, Rutland, and Lincoln, there being only five factories elsewhere, viz. in Wilts, Dorset, Devon, Cornwall, and Somerset, employing 1930 persons. No information is given as to the value of the work produced.

The origin of this manufacture is not known, but it appears to have existed from a considerably remote antiquity, as in the representations of Grecian female costume which have come down to us the dresses are frequently ornamented with lace of beautiful patterns. Mary de Medici is supposed to have been the first to introduce the use of lace into France from Italy, where it had been long previously worn. *Point-lace*, the oldest variety known, is supposed to have been the work of nuns during the latter half of the fourteenth and the beginning of the fifteenth centuries. It is the product of high art and of consummate patience, on a level with the art products of the monks in stone, wood, metal, and manuscript illumination. Point-lace is wonderfully durable, and has still a high value. There are several varieties of it, as *rose-point*, *Venetian-point*, *Portuguese-point*, *Maltese-point*, *point-d'Alençon*, and *Brussels-point*. Pillow or bobbin lace has been described above. *Gold-lace* and *silver-lace* are woven from exceedingly fine threads of these metals, or from threads of linen, silk, or cotton covered with still finer threads of gold or silver, and are used for decorating uniforms and other dresses. In England, from a prohibition in 1483 of the importation of foreign lace, the manufacture would seem to have been established there prior to that date. It was not, however, till upwards of a century afterwards that the weaving of lace became common in England. In 1640 it had risen to the position of a flourishing trade in Buckinghamshire, and twenty years later we find the importation of English lace, along with that of other countries, made the subject of a royal ordinance by the French government.

LACE-BARK TREE (*Lagetta lintearia*), a tree of the natural order Thymelaceæ or Daphne family, is a native of the West Indies. It attains the height of 12 or 14 feet, has a branchy trunk, alternate, ovate, lanceolate leaves, smooth on both sides, and white flowers disposed in clusters or terminal panicles. It inhabits the mountainous parts of St. Domingo and Jamaica. It receives its common name of lace-bark tree from the fact that when its inner bark is cut into thin pieces, after maceration, it assumes a beautiful net-like appearance. It is said that a governor of Jamaica presented Charles II. with a cravat, frill, and ruffles made of it. It is sometimes used by the females of the country by way of a toilet ornament, and the negroes manufacture matting from it.

LACEDÆMON. See SPARTA.

LACÉPÈDE, BERNARD GERMAIN ÉTIENNE DE LA VILLE-SUR-ILLON, COUNT DE, naturalist, peer of France, born at Agen 26th December, 1756, was from his youth passionately attached to natural history and music; he consequently abandoned the military profession, for which he was destined, and devoted himself to the study of natural history. His teachers and friends, Buffon and Daubenton, procured him the important situation of keeper of the collections belonging to the department of natural history in the Jardin des Plantes. At the breaking out of the revolution he was elected member of the legislative assembly, and belonged to the moderate party. To withdraw from the storms of the period of terrorism he resigned his situation, and retired to his country-seat, Lieuville. He again made his appearance under the directory, and was appointed one of the first members of the institution. Napoleon made Lacépède a member of the conservative senate, and conferred on him the dignity of grand-chancellor of the Legion of Honour, which he continued to hold throughout the imperial reign. At the first restoration he was deprived of this dignity, but was raised to the peerage by the king. In 1817 he published a new edition of Buffon's works. He likewise published a continuation of the work on the Cetacea, commenced by his great predecessors. His History of Fishes (five vols. 4to) is considered his principal work. He published likewise the Natural History of Oviparous Quadrupeds, and the Natural History of Reptiles. The complete collection of his works, in which are included two small novels, which appeared anonymously, and the opera Omphalé, is voluminous. Lacépède could adorn the driest subjects with the graces of a brilliant style. He died October 6, 1825, at his country-seat Epinay, near St. Denis, of the small-pox. Of Lacépède's very defective Histoire Civile et Militaire de l'Europe depuis les dernières années du V^e^ siècle jusque vers le milieu du XVIII^e^, in eighteen volumes, the two first volumes appeared after his death, Paris, 1826. His musical tastes and studies are represented in his Poétique de la Musique (two vols. 1785). Like most men of similar tastes and pursuits, he was very kind and amiable.

LACERTA, LACERTIDÆ. See LIZARD.

LACHAISE, FRANÇOIS D'AIX DE, confessor of Louis XIV., member of the congregation of Jesuits, was born in the Château d'Aix 25th August, 1624. His grand-uncle, Father Cotton, had been confessor of Henry IV. Lachaise commenced his course of studies in the Jesuit college at Rohan, and finished it at Lyons. He was the provincial of his order when Louis, on the death of his former confessor, Father Ferrier, appointed Lachaise his successor. This appointment occasioned surprise, because, on the one hand, the disputes between the parties of Jansenists, Molinists, &c., divided the court of Louis XIV., as also the capital; and on the other hand, no Jesuit, since Father Cotton, had been chosen to this important situation. The new confessor was soon involved in a web of court intrigues. Mme. de Montespan and Mme. de Maintenon, the Jansenists and Jesuits, stood opposed to each other, and Louis wavered like a reed between these parties. Nevertheless Lachaise maintained his ground, although he was equally obnoxious to Mme. de Montespan and Mme. de Maintenon. He knew how to conduct himself under all circumstances with address, coolness, and sagacity; and although a zealous Jesuit, he never allowed himself to be drawn into violent measures

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against his opponents. That Louis formally married Mme. de Maintenon was owing principally to the counsels of Lachaise; but that the marriage remained secret may likewise be attributed to him, and on this account he had constantly to endure the hatred of that ambitious woman. Lachaise retained the favour of his monarch till his death, which took place 20th January, 1709, at the age of eighty-five. He left philosophical, theological, and archæological works. Louis XIV. had a country-house built for him to the west of Paris, on an eminence which had received the name of Mount-Louis. Its extensive garden now forms the cemetery of Père Lachaise, the largest in Paris.

LACHLAN, a river of East Australia, rising in New South Wales, to the west of the Blue Mountains. It is formed by the union of several streams in lat. 34° S.; lon. 148° 30′ E. From this point the river makes a semicircular sweep north of about 240 miles, when, pursuing a generally south-west course, it is joined by the Murrumbidgee in lat. 34° 25′ S.; lon. 144° 20′ E.; the united stream afterwards falling into the Murray at lat. 34° 35′ S.; lon. 143° 10′ E. The total course may be estimated at 540 miles.

LACHMANN, KARL, a German critic and philologist, born at Brunswick 4th March, 1793. He studied at Leipzig and Göttingen, and became a professor at Königsberg in 1818, and afterwards at Berlin in 1827, where he died 13th March, 1851. His critical sagacity was very great, and he published valuable editions of the Latin and Old German classics. Among his editions of classical authors may be mentioned those of Propertius, Catullus, Tibullus, Terence, Babrius, and Lucretius, published at intervals from 1829 to 1845. His editions of the New Testament with the Vulgate translation, in which he attempted to restore the text to that of the Eastern Church of the third and fourth centuries, are considered, on the whole, the best that have yet been published. In his editions of the Niebelungen Lied, and of the poems of Walther von der Vogelweide, he performed a valuable service to ancient German literature. Lachmann translated Shakspere's Sonnets (1820) and Macbeth (1839).

LACHRYMÆ CHRISTI (literally 'tears of Christ'), a name given, somewhat profanely, to a fine Italian wine which is grown at the foot of Vesuvius. The taste is sweet but sharpish, and the bouquet excellent. There are two kinds, the white and the red, of which the former is generally preferred. Most of this wine known in commerce comes from Pozzuoli, Ischia, and Nola. Wine of a similar description is grown on several of the Greek islands, and also on the Islands of Candia and Cyprus. In the former it is called *Madera di Malvasia*, and in the latter Commandery wine.

LACHRYMAL ORGANS. See EYE.

LA CONDAMINE, CHARLES MARIE, was born at Paris on the 28th of January, 1701, and died at the same place on the 4th of February, 1774. With an ardent spirit and a powerful frame, the young La Condamine, who had entered the military profession, gave himself up to pleasure; but he soon renounced the military career, and devoted himself to the sciences. He entered the Academy as *adjoint chimiste*. His desire of knowledge induced him to apply himself to several sciences without entering very deeply into any particular one. After he had visited the coasts of Asia and Africa on the Mediterranean, he was in 1736 chosen, with Godin and Bouguer, to determine the figure of the earth, by a measurement to be made in Peru. (See EARTH.) He there made the discovery that mountains attract heavy bodies, and give them a direction different from that which they would take according to the simple law of gravity—a truth which was afterward confirmed by Maskelyne and Cavendish. Having finished his labours in America, and escaped a thousand dangers, he returned to his native land after an absence of eight years, and soon after went to Rome, where Benedict XIV. gave him a dispensation to marry one of his nieces. In 1748 he was elected a fellow of the Royal Society of London, and in 1760 a member of the Academy of Sciences of Paris. Of his curiosity the following anecdote is related. At the execution of Damiens he mingled with the executioners in order to let no circumstance of this horrible manner of death pass unobserved. They were about to send him back, but the chief executioner, who knew La Condamine, prevented them with these words: 'Laissez, messieurs, c'est un amateur.' His principal works are his account of his travels, his work on the figure of the earth, and that on the measurement of three degrees of the meridian in the equatorial regions. Besides these he published treatises on inoculation for the small-pox. His name, however, will probably be best known hereafter in connection with caoutchouc, which he was the first to introduce into Europe. During his residence in South America he observed the many uses to which the natives turned this substance, and he sent some of it to France. There it gradually attracted attention. Macquer and others examined it, its properties were slowly discovered, and now it is perhaps a substance capable of more varied application to different uses than any other. See CAOUTCHOUC.

LACONIA. See SPARTA.

LACONIC, applied to a brief and sententious mode of expression on which the Spartans particularly piqued themselves, as being men of deeds and not of words. The term is derived from the country Laconia, of which Sparta was the capital. Some of these *laconisms* bordered on the sublime; others savoured merely of affectation and arrogance. With reference to the latter, Epaminondas used to boast that his victories had taught the Spartans to lengthen their monosyllables.

LACORDAIRE, JEAN BAPTISTE HENRI DOMINIQUE, one of the greatest of modern pulpit orators, was born 12th March, 1802, at Recey-sur-Ource, in the Department Côte-d'Or. He entered the College of Dijon in 1812, and in 1819 began the study of law. Having graduated in law he repaired in 1821 to Paris, where he practised as a probationary advocate. In 1824, to the surprise of those who knew that his theological system was dictated by Voltaire, he entered the seminary of Saint-Sulpice, with the purpose of devoting himself to the church, and in 1827 received holy orders. Archbishop de Quélen appointed him almoner of the Visitation, and in 1828 he was made almoner-adjoint to the Collége Henri IV. He distinguished himself greatly as a preacher, and was offered the post of vicar-general by the Bishop of New York. The revolution of 1830 alone prevented him from leaving for America. He now formed a close alliance with the Abbé de Lamennais, and in conjunction with him and the Comte de Montalembert founded the democratico-catholic journal L'Avenir, in which the highest church principles and extreme radicalism were advocated with great eloquence and ability. On January 31, 1831, Lacordaire and Lamennais were cited before the Cour d'Assises of Paris for two articles that appeared in their journal, and though they made a successful defence, L'Avenir was condemned by Gregory XVI., and discontinued in 1832. Lacordaire, resuming his almonership of the Visitation, now devoted himself to the duties of the pulpit, and the freedom and eloquence with which he treated social affairs in his discourses attracted admiring and spell-bound audi-

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ences. The crowds that flocked to Notre-Dame were immense, and even the non-religious world was irresistibly attracted by the boldness and eloquence of the great preacher. After several visits to Rome he entered the novitiate of the Dominican order in 1839, and took the vows on the 6th of April, 1840. He added to his Christian name that of the founder, of whom he published a life in 1841, and again appeared in the pulpit of Notre-Dame in the habit of a Dominican friar. His fame as an orator being now fully established, his advocacy of charities was eagerly sought, not only in Paris, but in the provinces. In the first election after the revolution of 1848 he was chosen the representative in the Constituent Assembly for the department of Bouches-du-Rhône, and he took part in some of the debates. But after a few weeks' experience he resigned, and withdrew himself entirely from the region of politics. In 1850 the pope conferred on him the office of provincial of the Dominicans in France, which he held for four years, and then refused nomination for re-election. In 1853, in the church of Saint-Roch, he preached his last great sermon, in which the recent extensions of the imperial prerogative were handled with much boldness and vigour. Three volumes of his discourses were collected and published under the title of Conferences de Notre-Dame de Paris, 1835–50. His health declining, in 1854 he withdrew from Paris, and accepted the direction of the free college of Sorèze, where he continued to reside till his death, November 21, 1861. In 1860 he was elected into the Académie Française. Of his numerous works his Lettres à un jeune Homme sur la Vie Chrétienne (1858 and 1860) have been much admired.

LACQUER, a varnish for coating brass and some other metals, to give them a golden colour, to preserve their lustre, and to secure them against rust. (See LAC.) The term is also applied to a mixture of Swedish pitch and coal-tar, which is employed to coat the inside of certain shells for rifled guns. This is to prevent excessive friction between their interior surface and the powder with which they are charged during their flight.

LACQUERING is the art of coating metals with the coloured or transparent varnish called *lacquer*. Lacquered brass appears gilt, and tin is made yellow. Lacquering is also applied to the coating with varnish of goods in wood and papier-mâché. The Japanese and Chinese excel in works of this kind, their varnish being a natural secretion obtained by making incisions in the stem of the varnish-tree. Inlaid shell-work and designs painted in gold add beauty and value to these productions.

LACROIX, SYLVESTRE-FRANÇOIS, a distinguished mathematician, born at Paris in 1765, obtained the situation of teacher of mathematics in the marine school at Rochefort, and in 1786 became assistant to Condorcet in the Lyceum of Paris. The next year he was appointed teacher in the military school there, and in 1788 professor in the artillery school of Besançon. In 1794 he was professor in the normal school, in 1799 professor in the polytechnic school, and in May of the same year he was made a member of the Academy of Sciences. In 1815 he was appointed professor of mathematics in the University and in the College of France. In 1821 he resigned several of his appointments, and confined himself to a single professorship. He died at Paris 25th May, 1843. His most important works are Traité du Calcul Différentiel et du Calcul Intégral, Traité des Différences et des Séries, Traité du Calcul des Probabilités, and Cours des Mathématiques.

LA CROSSE, a city, Wisconsin, United States, capital of La Crosse county, situated on the east bank of the Mississippi, a little below where it is joined by the Black and La Crosse Rivers, and 195 miles W.N.W. from Milwaukee. It contains a court-house, about twelve churches, high-school, opera-house, &c.; is the centre of an extensive railway system, and carries on an important lumbering trade on the Black River. It has manufactures of agricultural machinery and implements, engine and boiler shops, iron-foundries, breweries, &c. Pop. 14,505.

LA CROSSE, a field-game played with a ball, and slightly resembling several other games, as golf, foot-ball, hockey, and racquet. It has long been a favourite with the Canadian Indians, eighteen of whom came to England in July, 1867, to exhibit the working of the game before the lovers of out-door sports. Each player has a battledore of hickory 5 or 6 feet long, bent at the top like a crozier, with a net-work of deer-skin string across the hooked part. The ball is of india-rubber, and about 3 inches in diameter. A few poles 6 feet in length, each with a small flag at the top, are the only other implements required. The players are arranged in sides, each side distinguished by wearing a particular colour, as red or blue, and their number is determined by circumstances, more players being required as the area is extended. At opposite ends of the field goals are set up, the one being of the colour of the one party, and the other of the other The game is won by that party which can drive its ball through the goal of the opposite colour, and the policy of the opposing party is to prevent this. The ball is hooked up from the grass by the crozier-shaped crosse, and is borne horizontally on the netting by the player, at full speed, as far as he can. When he is forced to part with it he contrives to throw it dexterously off the battledore towards a colleague, who may advance it further in the direction of the goal. The driving of the ball by one party through the goal of its own colour secures the game for the opposite party. Tripping up, and grasping one another are not allowed. The *goal-keeper* defends the goal; the first man out from the goal is *point;* a little in advance is *cover-point; centre* holds the centre of the field; while the player nearest the opposite goal is *home.* The other players are *fielders.*

LACTANTIUS, LUCIUS CŒLIUS FIRMIANUS, or LUCIUS CÆCILIUS FIRMIANUS, a celebrated father of the Latin Church, distinguished as an orator and author, is commonly supposed to have been of Italian descent, born possibly at Firmium on the Adriatic, and is known to have studied in Africa under Arnobius, who taught rhetoric at Sicca. He lived for a long time at Nicomedeia as a teacher of rhetoric, until Constantine the Great invited him to Gaul, and committed to his care the education of his eldest son Crispus. He died at Treves about 325. His writings (published by Sparke at Oxford, 1684; by Bünemann at Leipzig, 1739; by Dufresnoy at Paris, 1748; and by Fritsche in Gersdorf's Bibliotheca Patrum Latinorum (Leipzig, 1842–44) are characterized by a clear and agreeable style; and he is, from his pure and eloquent language, frequently called the *Christian Cicero.* The Editio Princeps of Lactantius, printed at the monastery of Subiaco in 1465, is one of the earliest specimens of the typographical art in existence, being in fact the first work printed in Italy with a date. His seven books, Institutiones Divinæ, are particularly celebrated, and worthy of notice.

LACTARINE. This is the casein of milk freed from fat, precipitated by an acid, thoroughly purified, dried, and powdered. It is insoluble in water, but is soluble in an alkali, such as ammonia, and in this form has been used for fixing pigment colours in calico-printing. The cloth, after it has been printed, is steamed, the ammonia is driven off, and the pigment is thereafter able to resist the action of water.

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It can be made still faster if the cloth, before printing, is subjected to lime-water. The lime which is absorbed by the cloth then reacts with the lactarine, and forms a compound which is not acted on by soap or soda. Lactarine is used chiefly for ultramarine. It is not so good as egg-albumen, but it is so much cheaper that it is consumed in very large quantities.

LACTEALS. See LYMPH.

LACTIC ACID ($C_3H_6O_3$). Scheele, in 1780, was the first to describe the acid present in sour milk. The question was afterwards much debated by chemists whether it was a distinct acid or an impure form of acetic acid, and the matter was not settled till 1832, when Liebig and Mitscherlich showed it to be quite distinct. The year following it was proved to be identical with an acid detected by Braconnot, twenty years earlier, in water in which rice had been steeped, and which, from his place of residence, he had called *nancéic acid*. Lactic acid has been minutely investigated; it has been found to be widely distributed; many modes of preparing it artificially have been worked out, and its isomeric varieties, of which four have been described, have excited much attention and interest. There are two principal kinds of the acid, namely, *fermentation lactic* acid and *para-* or *sarco-lactic* acid. The former is got from concentrated sour whey by removing the curd, adding lime, filtering, diluting with water, removing the lime with oxalic acid, evaporating, and extracting the lactic acid with alcohol. It is more usual, however, to get it by what is called the lactic fermentation, from sugar or saccharine substances. The sugar is dissolved in water; to the solution is added decaying cheese and a quantity of fine, well-washed prepared chalk, and the mixture is kept for some weeks between 86° and 95° Fahr. Fermentation begins, and much lactic acid is formed, which combines with the chalk, and forms lactate of calcium. This salt is then decomposed by sulphuric acid, filtered, and the fluid is boiled with carbonate of zinc. Lactate of zinc is formed, which is collected and decomposed by sulphuretted hydrogen. The fluid filtered from the sulphide of zinc is evaporated, and the syrupy fluid which remains contains the lactic acid. Various modifications of the process have been proposed. Lactic acid is a syrup (specific gravity, 1·215) which remains liquid even at very low temperatures. It deliquesces in moist air, dissolves in all proportions in alcohol and water; has no odour, and a purely sour taste. It cannot be distilled, or even heated, without undergoing decomposition, lactic anhydrides being formed; at a higher temperature carbonic oxide is evolved, and a variety of products distil over, and charcoal is left in the retort. By oxidizing agents, such as bleaching-powder and nitric acid, it is converted into oxalic acid; by oxide of manganese into aldehyde.

The other variety of the acid, called paralactic or sarcolactic acid, was observed in flesh by Berzelius in 1806, and he considered it the same as that derived from milk. Liebig, however, showed that they were not absolutely identical, but that they were distinguished by certain physical differences, and also by some of their salts being different. Since then other chemists have found that paralactic can be converted into common lactic acid, and that most of their decomposition products are identical, so that the nature of the differences between the two acids is at present unknown. This acid is readily got from the cold aqueous extract of flesh by adding a solution of baryta, coagulating and removing albumin, concentrating the solution, precipitating the baryta, filtering, and evaporating. The syrupy residue contains the acid. The difference between the two acids is seen in their compounds with calcium and with zinc. The calcium salt of the fermentation acid, or, as it might be called, calcic zymolactate, contains more water of crystallization, when heated it retains it for a shorter time, and it is more soluble than the sarcolactate. Again, the zymolactate of zinc contains more water, loses it more quickly on heating, but itself endures a much higher temperature without decomposition than the sarcolactate. The zymolactate is much less soluble in water and in alcohol than the other; the crystalline forms of the two salts also are different. The other salts of lactic acid are for the most part crystalline, and soluble in water. As lactic acid can form only one series of normal salts, it is monobasic; but by a special method sub-salts can be produced, which, however, are not stable in solution. Lactic acid forms compound ethers and substitution acids.

LACTOMETER, or GALACTOMETER (*gala*, Greek; *lac*, Latin, milk; *metron*, Greek, a measure), an instrument for determining the quality of milk. As milk is a very complex fluid, consisting of from 80 to 90 per cent. of water, and the rest of fat or butter, albumin, casein, milk sugar, and inorganic salts in different proportions, and as these vary with different animals, and in the same animal with its health, diet, and other circumstances, it is obvious that any rapid method of determining the quality of a given specimen, unless within certain limits, does not admit of much accuracy. The adulteration of milk with quite foreign substances, such as starch, gum, chalk, cerebral matters, &c., is either much exaggerated or altogether improbable or impossible. The chief falsification consists in removing the cream and adding water and a little salt or skimmed milk. The estimation of the quality of milk can be effected either by separating the constituents—the water by evaporation, the butter by extraction with ether, and so on—and weighing them, or by means of instruments specially devised for their measurement. Of these may be mentioned the various kinds of areometers, for taking the specific gravity of the milk, and in this way detecting whether or not it has been mixed with water. If an ordinary areometer for fluids heavier than water be employed, the specific gravity of milk ranges, according to some, between 1031 and 1025. A particular instrument for the purpose, called a *lacto-densimeter*, has been devised by Quevenne; it has the form of an ordinary areometer, but the stem is graduated between 1014 and 1042. The specific gravities are marked on the stem by a graduated scale, and one side is devoted to uncreamed, the other to creamed, milk. The readings represent the change of density by addition of $\frac{1}{10}$, $\frac{2}{10}$, $\frac{3}{10}$, $\frac{4}{10}$, and $\frac{5}{10}$ of water; so that the instrument gives at once the specific gravity and the degree of dilution. The only correction required is for temperature, when that is different from 15° Cent. (59° Fahr.)

Another instrument is the *crémometer* of Banks, for measuring the amount of cream. It consists of a straight glass, graduated to half-decilitres, and from the top mark it is graduated from 0° to 50° in hundredths. Into this the milk is carefully poured, allowed to stand for four-and-twenty hours at a mean temperature, and the thickness of the layer which forms at the top gives the richness in cream of the milk. Good milk treated this way gives from 10° to 14° of a layer. The *lacto-butyrometer* of Marchand gives the amount very rapidly. The instrument is a straight, narrow tube of glass, closed at one end, and graduated downwards from a little way below the open end. The milk is introduced, a drop or two of caustic soda added, and the milk is then agitated with an equal bulk of ether, and the instrument is filled to a certain mark with alcohol. The liquids are carefully mixed, and the closed tube warmed in a

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water bath until the buttery layer does not increase in thickness. It is then read off, and the quantity of pure butter, corresponding to the fatty matter, is ascertained by means of a table. Other lactometers, such as Dinocourt's and Chevallier's, have been used. Like Quevenne's they give the density of skimmed or of pure milk, and when the amount of cream has been determined it can then be said whether or not water has been unduly added.

LACTOSE (sugar of milk), ($C_{12}H_{22}O_{11}$). In the early years of the seventeenth century this substance was got by evaporating whey to dryness on the water bath, extracting the residue several times with water, and crystallizing. It afterwards attracted a good deal of attention, and its properties have been minutely examined. It is still best prepared by Bartholetti's process, just described, or by a slight modification of it. The whey obtained in the manufacture of cheese is evaporated to a syrup and allowed to stand, when the sugar deposits, and is purified by repeated crystallization and by decolourizing with charcoal. It forms white or almost colourless four-sided acuminated columns; it is soluble in water, but not so readily as common sugar, nor has it so sweet a taste, and it is insoluble in alcohol and in ether. It is dextrorotatory. When heated to about 260° Fahr. it loses water, and gradually passes into a kind of caramel. Though identical in composition with cane-sugar, it differs from it in some respects. Thus, it reduces alkaline copper solutions even in the cold; by treatment with nitric acid it yields mucic as well as saccharic acid; and by dilute hydrochloric or sulphuric acid it is converted not into dextrose or grape-sugar, but into a substance called galactose. Lactose is fermentable; but the action begins only after it has been in contact with the yeast for some time; and it is probable that the first stage of the action consists in its conversion into galactose, which is the substance that really undergoes fermentation. By contact with decomposing nitrogenous matter, such as cheese, lactose yields lactic acid in large quantity.

The amount of lactose contained in milk varies of course with the kind of milk, and with the diet and other circumstances, but it may be said to lie between 3·5 and 4·5 or 5 per cent. It is formed in the body as required, for the administration of sugar in the diet does not affect the amount contained in the milk.

LADAKH, or MIDDLE TIBET, a region, Central Asia, in the Western Himálaya, subject to Cashmere, having been conquered by Gholab Singh, the ruler of Cashmere, in 1835. It is bounded north by the Mustag or Kuenlun Mountains, east by Great Tibet, south by the districts of Lahul and Piti or Spiti, formerly included in Ladakh, and west by Cashmere and Balti, or Little Tibet; area, about 30,000 square miles; capital, Le or Leh. It is divided into four districts—Leh or Ladakh proper, Nubra, Zanskar, and Rupchu. The country, generally, is an elevated table-land in the Himálayas, about 11,000 feet above sea-level, and constitutes part of the upper valley of the Indus, which stretches south-east and north-west through the greater part of the country. Into this valley a number of small valleys open, forming basins for the tributaries of the Indus; the chief of which are Shayok on the north, and Zanskar on the south. The great mountain ranges of Ladakh consist of granite, quartz, slate, and gneiss; but in the south-east are lofty mountains of recent formation, flanking, and even overtopping, the mountain ranges, and chiefly composed of calcareous rocks. Ladakh does not appear to be rich in metals, though veins of lead, copper, and iron exist, and a little gold has been found in the waters of the Shayok. The climate is characterized by cold and excessive aridity. The extreme dryness of the atmosphere is unfavourable to vegetation; and hence the grass, and the furze and other prickly plants, have at all seasons a brown and scorched appearance. These form the only food of the indigenous sheep, which, however, attain great size, and are so strong and active as to be the only beasts of burden employed in many parts of the country. Of domestic quadrupeds the principal are horses, yaks, cows, the zho (a cross between the male yak and the cow), asses, sheep, and goats. The rivers teem with fish, but the natives, from some superstitious motive, leave them unmolested. The cultivated crops are chiefly wheat, barley, and buck-wheat. The manufactures of Ladakh are rude and unimportant. There is a considerable transit trade, Ladakh being naturally the great thoroughfare between Chinese Tartary and Tibet, on the one hand, and the Panjab on the other. The language is Tibetan, and the government a despotism controlled by the priesthood. The inhabitants are of Mongolian race and Buddhist religion. They are mild, peaceable, and honest; but timid, indolent, dirty, and given to intoxication. Polyandry prevails. Pop. 125,000.

LADIES OF THE BEDCHAMBER, THE, are personal attendants on her majesty, and minister to her state. They are eight in number, and have three extra ladies attached to them. There are also eight *bedchamber women*, besides three extra ones, of whom one is resident. Together with the mistress of the robes and the maids of honour, these are known as the *ladies of the queen's household.*

LADIES' SLIPPER (*Cypripedium*), a beautiful genus of orchideous plants, conspicuous for its large, inflated flowers. The roots are perennial; the stems simple, bearing entire sheathing leaves; and the flowers are solitary or few in number. The species are confined to the northern regions of the globe: six inhabit the Alleghany Mountains, Canada, and the northern parts of the United States; and five are found in Siberia and the northern and mountainous parts of Europe.

LADING, BILL OF. See BILL.

LADOGA, a lake of Russia, between the governments of St. Petersburg on the south, Olonetz on the east, and Viborg on the north and west; greatest length, north to south, 130 miles; average breadth, about 75 miles; area, 7156 square miles. It is the largest lake in Europe, and receives no fewer than seventy streams, the principal of which are the Volkhov and Siasi, which enter it on the south, and the Svir, which enters it on the east, bearing the surplus water of Lake Onega. It discharges itself, at its south-west extremity, by the Neva, which falls into the Baltic. It contains numerous islands, many of which are inhabited, and its shores are much indented, generally low, and send out so many shelving rocks into the water, as to make the navigation very dangerous. To avoid the danger a canal 74 feet wide, giving the Volkhov a direct communication with the Neva, has been cut along its south shore. It has numerous strong currents; and violent storms are frequent. It is well supplied with fish, and contains seals.

LADRONES, or MARIANNE ISLANDS, a group of sixteen islands in the North Pacific Ocean, north of the Caroline Islands, extending in a N.N.E. direction, from near lat. 13° to 21° N.; lon. 144° 30′ to 146° E. Guahan is the southernmost and largest of these islands; and next in importance is Rota. The islands are mostly of volcanic origin, and are very rugged, but their general aspect is picturesque, being densely wooded and covered with a perpetual verdure; the soil also is extremely fertile. Wild hogs abound, many of them are of great size, and formidable to the hunter. Mosquitoes, and an endless variety of insects, are also numerous. The inhabit-

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ants are tall, robust, and active, and naturally acute, lively, and ingenious. Their huts are constructed of palm-trees, and divided by mats into different apartments. The islands were discovered by Magelhaens in 1521, and were settled by the Spaniards, to whom they still belong, in the middle of the following century. Magelhaens called them *Islas de Ladrones* (Thieves' Islands), because the natives stole everything of iron which they could find. Towards the end of the seventeenth century they received the name of *Mariana* or *Marianne* Islands, from the Queen of Spain, Marianne of Austria, the mother of Charles II., at whose expense the Jesuit missionaries were sent over, who settled here in 1667. The chief inhabitants are settlers from Mexico and the Philippines, the Spaniards being now few in numbers, and the aborigines having nearly altogether disappeared. That useful plant, the bread-fruit tree, was first discovered here. Pop. about 8000.

LADY (Anglo-Saxon *hlæfdiye*, that is, *hlâfwearddiye*, bread-keeper), applied originally to the female head of a household; next to a woman of social distinction, as the feminine correlative of *lord;* and generally to any woman of refined manners, in that case the feminine corresponding to *gentleman*. As a title it is borne by the wives of knights, and of all degrees above them, except the wives of bishops. The legal designation of the wife of a knight or baronet is *Dame*, though it is customary to design her by *Lady* prefixed to her husband's surname. Peeresses, and the wives of peers, whether by right or courtesy, are distinguished by the word Lady prefixed to the peerage title. The daughters of the three highest orders of nobility prefix this title to their Christian name and surname, and though married to a commoner the title is retained, with the substitution of her husband's surname for her own. Her marriage does not deprive her of her precedence. But should she marry a peer of lower rank than her father she must adopt the rank and title of her husband, and lose her precedence. If, however, her husband is only a peer by courtesy she may prefix Lady to her Christian name, and for her surname she may assume the courtesy title of her husband, but when her husband succeeds to the peerage she must take his title and precedence. When the daughter of a peer of higher rank marries the son of a peer of rank inferior to that of her father, she *may* design herself by prefixing Lady to her own Christian name and her husband's surname, and then she retains the precedence which she had when unmarried. As in England the wife of a bishop cannot be called Lady, so in Scotland the wife of a Lord of Session is designed by Mrs. prefixed to her husband's surname.

LADY-BIRD, a species of beetle, belonging to the genus *Coccinella*, distinguished by the red *elytra* or wing-cases, bordered with yellow, and having a black spot in the middle of each. The general body-colour, however, varies greatly; and the lady-birds may be coloured with black spots upon a ground colour of red or yellow, or *vice versa*, with red or yellow spots upon a grounding of black. The determination and recognition of species, and the distinction between species and mere varieties, are thus rendered exceedingly difficult. And this state of matters is rendered still more confusing when we consider that the general term of 'lady-bird' has been indiscriminately applied to all small beetles of this genus, irrespective of peculiarities in marking, or even in structural respects. The common species of lady-bird, and that which, *par excellence*, is the pet of children, is the *Coccinella 7-punctata*. The Coccinellæ feed upon the aphides or plant-lice, which commit so great devastation in our gardens and among our flowers and shrubs; and they are to be viewed as the chief agents in suppressing the almost illimitable increase of these minute pests. The larvæ or caterpillars of the lady-bird are produced from eggs, deposited on leaves in little collections, which exactly imitate groups of nine-pins in a straight or standing condition. The larva possesses a short and somewhat spindle-shaped body and six anterior legs, and moves actively about the plant on which it is situated. The colour of the larval body is a dark slate-gray, spotted with orange or yellow spots. Whilst in this state the lady-bird commits great havoc among the aphides which with itself are co-tenants of the plant. It feeds upon the plant-lice until ready to enter upon the next or *pupa*-stage of its existence—a period which is ushered in by the larva fixing the posterior part of its body to a leaf. The pupa-form is liberated by the bursting of the larval skin, when the pupa appears, the colour changing from white to black, interspersed with yellow or red spots. The pupa remains generally attached to the place to which the larva fixed itself, and at the end of a variable period, extending from a week to ten days or more, the pupa in its turn bursts, and the perfect or imago lady-bird comes forth, and with the development of its colours the mature form is completed. The wings and wing-cases of the perfect form are at first soft and dusky, but soon assume the necessary fineness appropriate and peculiar to the perfect form. The lady-birds appear when crushed or irritated to emit an irritating fluid, which by some has been highly praised as a remedy for toothache, but which has no real value or effect.

LADY CHAPEL, a chapel dedicated to the Virgin Mary, and when attached to cathedrals, generally, though not always, placed eastwards from the altar. The lady chapel of Westminster Cathedral is that usually known as Henry VII.'s.

LADY-DAY (the Annunciation of the Virgin Mary) is one of the regular quarter-days in England and Ireland, on which rent is made payable. It falls on the 25th of March in each year. In the Roman Catholic Church it is held as a great festival, and is a very ancient institution in the Latin Church. In the English Church it is observed as a feast. In France the day is termed *Notre Dame de Mars*.

LAENNEC, René Théophile Hyacinthe, born at Quimper, 17th February, 1781, a distinguished French physician. After commencing the study of medicine under an uncle at Nantes, he proceeded to Paris in 1800, and attached himself to the Hôpital de la Charité, then under the direction of Corvisart. He took his degree of Doctor of Medicine in 1814, and his professional reputation was already so high that in the same year he was appointed principal editor of the Journal de Médicine. In 1816 he was appointed chief physician to the Hôpital Necker, and soon after made the splendid discovery of mediate auscultation, that is, of the use of the stethoscope. The original discovery, however, is claimed for Avenbrugger. In 1819 he published his Traité de l'Auscultation Médiate, having read a memoir on the subject to the Academy of Sciences in the previous year. The remainder of his life was devoted to the perfecting of this new system of diagnosis, and so far as diagnosis is concerned his Treatise has produced an effect not attained by any other work. His assiduous application injured his naturally delicate health, and he was obliged to resign both his studies and his practice, and retire to his native province. His health being somewhat recruited he returned to Paris in 1821, and was appointed professor of medicine in the College of France. The following year he was appointed professor of clinical medicine, and regularly performed

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the duties of his office till 1826, when his health again failed him. He died of consumption on the 13th of August of the same year. The special study of Laennec was diseases of the chest, and by means of auscultation, either by the direct application of the ear, or of the stethoscope as an auxiliary, he completely elucidated the pathology of these diseases, which were previously involved in the greatest obscurity.

LAERTES, a son of Acrisius and Chalcomedusa, was one of the heroes engaged in the chase of the Calydonian boar, and in the expedition of the Argonauts. He afterwards married Anticleia, the daughter of Autolycus, by whom he had Ulysses and Ctimene. He attained a great age. The long absence of his son in the Trojan war plunged him into deep melancholy; but his return restored the old man's energies, and he took part in the fight with the Ithacans.

LÆTARE SUNDAY, called also MID-LENT, is the fourth Sunday in Lent. The introit for the day in the Roman Catholic Church begins with the words *Lætare, Jerusalem*, from Isaiah lxvi. 10; hence the name. On this day the music of the organ, suspended throughout the rest of Lent, is resumed.

LA FAYETTE, a town of the United States, in Indiana, capital of Tippecanoe county, on the east bank of Wabash River, 63 miles north-west of Indianapolis. It is built on rising ground at the intersection of eight railways, and is inclosed in the rear by hills and cliffs. Including its suburbs, it covers an area of 2 square miles. It has iron-foundries, paper, planing, and flour mills, pork-houses, a woollen factory, and manufactures of agricultural implements, leather, soap, candles, beer, and spirits. Its ample means of transport by water and rail enable it to command the trade of the surrounding rich agricultural country. Pop. in 1880, 14,860.

LAFAYETTE, MARIE MAGDELAINE DE LA VERGNE, COUNTESS DE, a lady of literary celebrity, daughter of an officer and nobleman of Provence, who was governor of Havre de Grace. A careful and classical education had given her a great love for literature. In 1655 she married Count Francis de Lafayette, and her house now became a place of meeting for the most distinguished men in her time. The famous Duke of Rochefoucauld was one of her intimate friends. Among the learned men who surrounded her the most distinguished were Huet, Ménage, Lafontaine, and Ségrais. She died 1693. Her works entitle her to an honourable place among French writers, her novels being the first in France written in a natural style, and devoid of affectation and exaggeration. The most distinguished of them are Zaïde, La Princesse de Clèves, and La Princesse de Montpensier. Several of her Mémoires of contemporary history have been published, and she left others which have not yet seen the light. Her collected works were published in eight vols. 12mo, Paris, 1786, with a notice of her life. Her correspondence was published in 1805.

LAFAYETTE, MARIE PAUL JEAN ROCH YVES GILBERT MOTIER, MARQUIS DE, was born at Chavagnac, near Brioude, in Auvergne, in the present department of Upper Loire, Sept. 6, 1757, and belonged to one of the most eminent families in France. He was educated in the College of Louis le Grand in Paris, and at the age of seventeen was married to the grand-daughter of the Duke de Noailles. He entered the army as an officer of the Guards, and on hearing of the declaration of independence by the American colonists determined to lend them his assistance. In 1777 he left France for America, having fitted out a vessel for himself, and arrived at Charleston, South Carolina, April 25, being then nineteen years old. The sensation produced by his arrival was very great. He entered the American service as a volunteer, without pay, was appointed major-general, and was wounded at Brandywine. He was employed in Pennsylvania and Rhode Island in 1778, and after receiving the thanks of the country for his important services, embarked at Boston, in January, 1779, for France, where it was thought that he could assist the cause more effectually for a time. He was received with enthusiasm, and obtained assistance both in men and money for the Americans. In 1780 he returned to America, and in the ensuing campaign rendered important services to the cause of independence, especially in Virginia, where his opponent was Lord Cornwallis. He drove the British into Yorktown, and on the surrender of Cornwallis he was publicly thanked by Washington. He returned to France on the close of the campaign, but at the urgent request of Washington paid a third visit to America in 1784. He was called to the Assembly of the Notables in 1787, and was elected a member of the States-General, which took the name of *National Assembly* (1789). In the assembly he proposed a declaration of rights, and the decree providing for the responsibility of the officers of the crown. Two days after the attack on the Bastille he was appointed (July 15) commander-in-chief of the National Guards of Paris, and gave them the tricolor cockade. It was through his means that the lives of the king and queen were saved from the mob that had taken possession of the palace at Versailles. After the adoption of the constitution of 1790 he resigned all command, and retired to his estate of La Grange. He had previously resigned his title, the abolition of titles having been decreed by the National Assembly. The first coalition against France (1792) soon called him from his retirement. Being appointed one of the three major-generals in the command of the French armies, he established discipline, and defeated the enemy at Philippeville, Maubeuge, and Florennes, when his career of success was interrupted by the domestic factions of his country. During the Reign of Terror commissioners were sent to arrest him, on which he determined to leave the country, and take refuge in some neutral ground. Having been captured by an Austrian patrol he was delivered to the Prussians, by whom he was again transferred to Austria. He was carried with great secrecy to Olmütz, where he was subjected to much privation and suffering, and cut off from all communication with his friends, so that they were not even able to discover the place of his confinement until late in 1794. After the memorable campaign of Bonaparte in Italy the French government required that the prisoners at Olmütz should be released, which was done Aug. 25, 1797, after a negotiation that lasted three months. Refusing to take any part in the revolutions of the 18th Fructidor, or of the 18th Brumaire, he returned to his estate at La Grange, and declining the dignity of senator offered him by Bonaparte, he gave his vote against the consulate for life, and taking no further part in public affairs, devoted himself to agricultural pursuits. On the restoration of the Bourbons in 1814 he perceived that their principles of government were not such as France required, and he did not therefore leave his retirement. In 1818 he was chosen member of the Chamber of Deputies, and was a constant advocate of liberal measures. In August, 1824, he landed at New York on a visit to the United States, upon the invitation of the president at the request of Congress, and was received in every part of the country with the warmest expressions of delight and enthusiasm. Congress voted him 200,000 dollars and a township of land; his own fortune had been mostly lost by confiscation during the Terror.

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In Nov. 1827, the Chamber of Deputies was dissolved, and Lafayette was again returned a member by the new elections. During the revolution of July, 1830, he was appointed general-in-chief of the National Guards of Paris, and though not personally engaged in the fight, his activity and name were of the greatest service. When the National Guards were established throughout France, after the termination of the struggle, he was appointed their commander-in-chief, and his activity in this post was admirable. He, however, sent in his resignation in Dec. 1830. Henceforth he confined himself to the performance of his duties as a member of the Chamber of Deputies. He died on the 20th of May, 1834.

LAFFITTE, JACQUES, a celebrated banker in Paris, and a very estimable man, was born at Bayonne, 24th October, 1767, and by his own diligence and merit acquired a fortune in the banking-house of the senator Perregaux. In 1809 he became the head of the firm, which he made one of the first houses in France. In the same year he was appointed director of the Bank of France, and in 1814 governor of the same establishment. In 1809 he was made president of the chamber of commerce in Paris, and in 1814 judge of the Tribunal of Commerce. When the credit of France, in 1815, was at a very dangerous crisis, Laffitte advanced 2,000,000 francs in ready money, by which means a necessary article in the capitulation of Paris was settled. He was elected to the Chamber of Deputies in 1816. In 1819 he was deprived of the presidency of the bank, which was bestowed on the Duke of Gaeta; yet he was in 1822 unanimously re-elected to the office of *régent de la banque* (director). He was not re-elected for the Chamber of Deputies for the session of 1824. By favouring the reduction of the rentes he appears to have lost his popularity. How great the confidence reposed in Laffitte was, the following fact will serve to show. When Louis XVIII. was compelled to flee in 1815 he intrusted his private property, for safe keeping, to Laffitte; three months after Napoleon, under the same circumstances, showed him the same confidence, and at St. Helena named him his executor. Laffitte was again elected to the Chamber of Deputies in 1827. He took an active part in the revolution of July, 1830, being one of the deputies who signed the protest, and declared themselves deputies of France, in spite of Polignac's order to annul the election. November 3, 1830, he was made minister of finance and president of the council, in which situation he remained until March, 14, 1831, when he was succeeded by M. Casimir Perrier, belonging to the left centre. Laffitte became bankrupt in his latter days, and was obliged to sell all his property to pay his debts; but his Paris hôtel was preserved to him by a national subscription. He died on the 26th of May, 1844. Arago and Dupin delivered orations over his grave.

LAFONTAINE, JEAN DE, one of the most original men of genius of the age of Louis XIV., was born at Château-Thierry, 8th July, 1621. His father was overseer of the waters and forests, and it is supposed he received his early education at Rheims. At the age of twenty he placed himself under the fathers of the oratory, with whom he remained, however, only eighteen months. He appears not to have attempted poetry till his twenty-second year. He was invited to Paris by the Duchess de Bouillon, who first put him upon writing his tales. After being patronized by several persons of distinction Madame Sablière took him into her house, and freed him from the domestic cares to which he was so ill suited. He was in habits of intimacy with Molière, Boileau, Racine, and all the first wits of Paris, by whom he was much beloved for the candour and simplicity of his character, which acquired for him the title of *le bon homme*. But he was no favourite with Louis XIV., and was the only writer of merit of the time who did not share in the royal bounty. The king even hesitated some time to confirm his nomination to the French Academy. After the death of Madame Sablière he was invited by Madame Mazarin and St. Evremond to take up his abode in England; but his attachment to the circles of Paris prevented him from going there. In 1692 he was seized with a dangerous illness, but he survived it, and passed two years in the house of Madame d'Hervart. During this period he carried into execution what was humorously termed a *projet de conversion*, and spent the remainder of his life in a kind of artificial penitence not uncommon with sated voluptuaries in those sensual days. During this time he undertook to translate some pious hymns, but did not succeed in this new species of composition. He died at Paris 13th April, 1695. Both the Tales and the Fables of Lafontaine have been superbly printed. Of the former (the license of which keeps them out of many libraries) the best edition is that of Paris, 1762, with Eisen's designs and vignettes, by Choffat. Of his Fables innumerable editions have been printed; but the most magnificent is that in four vols. folio, 1755–59, in which each fable is adorned with a plate, executed with zoological precision. Gustave Doré has also executed illustrations for these poems. Lafontaine is also the author of Les Amours de Psyché, a romance; Le Florentin and L'Eunuque, comedies; Anacreontiques, &c. The most complete edition of his works is that published at Paris in six vols. 8vo in 1814, preceded by a notice of his life by L. S. Auger.

LAGO MAGGIORE, or LAKE OF LOCARNO (anciently *Verbanus*), a large lake in Northern Italy, common to the Swiss canton of Tessin, Piedmont and Lombardy, extending from Sesto to Locarno; about 39 miles long and 7 broad. It is 621 feet above the level of the sea, and at the northern end in some places as deep as 2500 feet. It is traversed by the Ticino. Its waters, which are as clear as crystal, contain various fish. Its banks abound in every Alpine beauty, and are adorned with a number of picturesquely situated villages and towns. On all sides it is surrounded by hills, planted with vineyards and plantations of chestnuts, interspersed with villas. There are several islands, two of which, Isola Bella and Isola Madre, called *Borromean Islands*, are laid out in gardens and pleasure grounds, with palaces erected on them adorned with paintings, sculptures, &c. Isola de' Pescatori is inhabited by fishermen. See *Borromei Islands*.

LAGOMYS, the generic name of the Calling Hares, or Pikas, found in Russia, Siberia, and the northernmost parts of the North American continent. These animals resemble the common hare in form and appearance, and are included in the hare family, that of the Leporidæ. They differ from the ordinary hares in the nearly equal length of the fore and hind legs, in the very small size or absence of the tail, and in the possession of nearly complete clavicles or collar-bones. In their most southern distribution the Calling Hares inhabit the mountainous districts and highlands. The familiar name of the lagomys is derived from their peculiar cry, which is described as resembling a piping call. They gather together a winter-store of food, and live in small communities or warrens, in burrows excavated in the ground. The store of food is made easily accessible by the presence of an inner burrow which communicates with the nest or dwelling-place.

LAGO NERO, or NEGRO, a town in Italy, Naples, in Potenza, at the foot of the Apennines, near a lake from which it receives its name; 12 miles east by

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north of Policastro; population, 4762. In March, 1806, a battle was fought here between the French and the troops of the King of Naples, in which the former were victorious.

LAGOON (from the Latin *lacuna*, a gap or hollow), n. name given particularly to shallow lakes or creeks connected with the sea, which are found along some low-lying coasts, as on that of the Adriatic near Venice. It is also applied to the expanse of water in the interior of those coral reefs which present to view above the surface of the water nothing but an external fringe. See CORAL.

LAGOS (ancient *Lacobriga*), a seaport town in the south of Portugal, in the province of Algarve, on a bay at the mouth of a stream of same name, 110 miles south of Lisbon. It is well built, and has among its edifices a very handsome church and a fine aqueduct. Both the town and harbour are defended by forts. The tunny and sardine fisheries are very productive, and employ many of the inhabitants. Two naval battles were fought off this place, in one of which the French Admiral Tourville surprised and in great part destroyed an Anglo-Dutch fleet of much greater strength than his own (June, 1693); and in another of which a French fleet under De la Clue was defeated by an English fleet under Admiral Boscawen (August 17, 1759). Pop. 7279.

LAGOS, an African island and a town situated on it in a lagoon on the Slave Coast, Bight of Benin; lat. 6° 20′ N.; lon. 3° 30′ E. Lagos is a Portuguese name signifying 'lakes;' the native name is Eko. It is an important place for commerce, and its importance in this respect seems likely to increase, as it is the only point of communication with the outer world for an extensive and fruitful district of the interior. The chief article of commerce is palm-oil. At present trade is much hampered by the feuds between the native chiefs of the interior. It was one of the most notorious slave stations on the African coast. In 1851 the British consul, while attempting to negotiate a treaty for the abolition of the slave-trade, was fired upon. After an ineffectual attempt to punish the outrage a British force was organized and took the place, though strongly fortified by stockades, and defended by 5000 men. A treaty was signed in consequence prohibiting the slave-trade, abolishing human sacrifices, and granting full freedom not only to trade but to diffuse Christianity. In 1861 it was taken possession of by the British, who also established a protectorate over a portion of the surrounding district. Lagos and the Gold Coast have recently (in 1874) been placed under one governor, who resides at Cape Coast Castle; while Lagos is governed by an administrator under the governor. The population of Lagos, according to a census taken in 1871, was 36,005, of whom only 82 were white. The population of the entire settlement according to census of 1881 was 75,270, including 117 whites. Among the inhabitants are some Mohammedans from Inner Africa, and these are the only part of the black population who are in good circumstances. In 1881 the value of the imports into Lagos amounted to £333,659, and that of the exports for the same year to £460,007. The revenue for the same year was £42,421, the expenditure being £45,461.

LAGRANGE, JOSEPH LOUIS, a celebrated mathematician, was born at Turin January 25, 1736, and died at Paris April 10, 1813. His great-grandfather was a cavalry officer in the French army, who afterwards passed into the service of Sardinia, where he settled. Lagrange early displayed a natural taste for mathematics, and he studied with such ardour that in his eighteenth year, in a letter to the celebrated Fagnano, he communicated to him a number of mathematical discoveries which he had made. When scarcely nineteen years of age Lagrange was made mathematical professor in the artillery school at Turin; and the memoirs of the scientific association, which he established with the approbation of the government, and in conjunction with the celebrated Cigna and the Marquis of Saluces, as well as his solution of the questions that had been proposed a long time before by Euler on the calculation of isoperimetrical figures, and on the theory of the least action, a solution which he achieved before he was twenty-five years of age, excited such attention in the literary world that he was elected a fellow of the Academy at Berlin (1759), and Euler and D'Alembert entered into a constant correspondence with this young man. In 1764 he obtained the prize of the Academy of Sciences in Paris for a treatise on the libration of the moon, and in 1766 for another on the theory of the satellites of Jupiter. It was about this time that he made a visit to Paris, where he became personally acquainted with the leading *savants* of the day, including D'Alembert, Clairaut, and Condorcet, with some of whom he had already been in correspondence. Soon after his return he received an invitation from Frederick the Great, to whom he had been recommended by D'Alembert, to go to Berlin, with the title of Director of the Academy, in place of Euler, who had gone to St. Petersburg (1766). The King of Sardinia was, however, very reluctant to permit his distinguished subject to depart. Esteemed by the great Frederick, who preferred his independent spirit to the somewhat too submissive character of Euler, and valued highly by all who became acquainted with him, Lagrange lived in Berlin in pleasant circumstances (which were interrupted, however, by the continual sickness of his wife) during the lifetime of the king. During his residence at Berlin he enriched the collection of the Academy of Berlin with a large number of memoirs, and wrote his great work La Mécanique analytique. After Frederick's death (1786) the regard which had been paid to men of genius and talent at the Prussian court declined. At this period Mirabeau saw him in Berlin and resolved to obtain this renowned geometrician for France. Lagrange accepted the offers made him from Paris, and declined the proposals made at the same time by the ambassadors of Naples, Sardinia, and Tuscany. He was received at Paris in 1787 with the highest tokens of respect. But a deep melancholy seemed to have taken entire possession of him and to have palsied his mind, notwithstanding all the efforts which his friends made to remove it. He suffered the same inconvenience which D'Alembert had once before experienced, viz. of having lost all love for his science. Lagrange now zealously employed himself upon the history of religion, the theory of ancient music, languages, and even the medical sciences. His own favourite science alone had no attractions for him, and he even suffered the Mécanique analytique (which was published at Paris in 1788) to lie untouched for two years after its publication. At the proposal of Du Séjour he was in 1791 confirmed by the National Assembly in his pension of 6000 francs, and in order to indemnify him for the depreciation of the paper currency he was first appointed a member of committee for rewarding useful inventions, and afterwards (in March, 1792) one of the directors of the mint. Dissatisfied with this station, although Cicero and Newton had discharged similar offices, he soon resigned it, considering it as an oppressive burden. In the same year he was married for the second time to a daughter of the academician Lemonnier, hoping to lead a tranquil life in the midst of the storms of the revolution. The decree of October 16, 1793, commanding all foreigners to leave France, and the execution of Bailly, Lavoisier, and other distinguished

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men, soon, however, destroyed his illusions. Through the instrumentality of Guyton Morveau the severe law of banishment from the country was not put in force against him, but the danger of becoming a victim to the rage of the infuriated populace remained. Hérault de Séchelles offered to procure him a place in an embassy to Prussia; but Lagrange, who had conceived a warm affection for his new country, preferred to remain there in spite of the danger. Peace and quiet at length returned. It was proposed to restore the institutions for the promotion of learning, which had been destroyed during the reign of anarchy, and Lagrange was appointed professor in the newly-established Normal School (École normale supérieure) at Paris (1794), as well as in the École polytechnique. In these new spheres of influence his former love for his science returned with all its strength. At the formation of the French Institute (1795) the name of Lagrange was the first on the list of members, and he was, likewise, the first member of the newly-constituted bureau of longitudes. His fame now increased from day to day, and France, feeling honoured in the possession of such a man, determined to give him a public mark of her esteem. By the command of the Directory, the minister of foreign affairs, Talleyrand, commissioned the French *chargé d'affaires* in Turin, citizen D'Eymar, to visit Lagrange's father and congratulate him in the name of France in having such a son. This commission was performed by D'Eymar in the most brilliant manner, accompanied by several generals and other distinguished persons. Napoleon respected the talents and services of Lagrange not less than the republic had done, and while consul and emperor he never ceased to show him distinguished tokens of his favour in every possible way. Member of the senate, grand officer of the Legion of Honour, and count of the empire, Lagrange saw himself surrounded with every external honour; but neither this nor the confidence reposed in him by the head of the state could make him vain, and, as modest and retiring as ever, he devoted himself with the same zeal and industry to his studies. His application probably hastened his death. Notwithstanding his advanced age he could not be content to relax his exertions, and had just completed the publication of the second edition of his Théorie des Fonctions analytiques, enriched with annotations, when, exhausted by his labours, he died. His remains were interred in the Pantheon. Lacépède and La Place pronounced funeral addresses over his body.

Lagrange was no less amiable than modest, and was never led by the honours bestowed upon himself to underrate the merits of others. His respect for Euler was unlimited, and he was frequently accustomed to say to his scholars, 'Study Euler if you would become geometricians.' His works have been partly published separately, and are partly contained in the memoirs of the Academies of Turin, Berlin, and Paris, in the Journal de l'École polytechnique, the Connaissance des Temps, and in the Ephémérides. The most important are his Mécanique analytique (Paris, 1788; new editions 1811, 1815, and 1853–55), Théorie des Fonctions analytiques (Paris, 1797, 1813, and 1847), Résolutions des Équations numériques (Paris, 1798, 1808, and 1826), Leçons sur le calcul des Fonctions, and Essai d'Arithmétique politique. A part of Lagrange's posthumous papers were in 1815 given to the Institute by Carnot, minister of the interior; and by a subsequent vote of the Academy of Sciences they were incorporated with the library of that learned society. All his works are written in French except the letter addressed to Fagnano mentioned at the beginning of the article. A magnificent edition of the works of Lagrange, edited by J. A. Serret (Œuvres complètes de Lagrange) was published at Paris in 1867–70.

LA GUAYRA. See GUAYRA.

LA HARPE, JEAN FRANÇOIS DE, a French dramatic poet, critic, and philosopher of the last century, born at Paris November 20, 1739; died there February 11, 1803. His father, a Swiss officer in the French service, dying in indigence, Asselin, president of the College of Harcourt, admitted him into that seminary, where he received an excellent education. After leaving the college he supported himself by authorship. In 1762 he published a collection of poems. The tragedy of Warwick (1763) was very beneficial to him in a pecuniary point of view, and procured him considerable reputation, as well as the friendship of Voltaire, to whom the piece was dedicated. It still keeps the stage. His Timoleon and Pharamond met with less success; but a series of *éloges* on Charles V., Catinat, Fénelon, Voltaire, and Henri Quatre (especially the last), gained him much credit in a different department of literature. In all his works La Harpe exhibits himself as the disciple of Voltaire. His tragedies, epistles in verse, and satires, are little else than frigid copies of the corresponding works of that author; and even his style of criticism is an imitation, the model of which is found in several dissertations of his master. Criticism was, however, his true vocation. He had a just and refined taste, and a keen sense of the beauties and defects in every species of composition, and in pointing them out wrote with a warmth and sensibility which he did not reveal in any of his other works. From February, 1768, he acted as critic for the Mercure de France, and for forty years he exercised his judicial functions with so much severity and arrogance, indeed, as to raise up against him innumerable enemies, but at the same time with acknowledged pre-eminence. On the breaking out of the revolution La Harpe embraced the principles of republicanism; but during the reign of terror, his moderation rendering him an object of suspicion to those then in power, he was in 1793 thrown into prison, where his ideas underwent a complete change. In his misfortunes he sought the consolations of religion (in consequence, it is said, of the arguments of his fellow-captive the Bishop of St. Brieux), abjured his former views, and declared himself one of the adversaries of the philosophical party, of which he had formerly been an adherent. Though sentenced to deportation, the changes of the times finally restored him to liberty, when he resumed the lectures he had begun to deliver upon literature when he was thrown into prison. He continued these lectures for twelve years with uniform success, and afterwards collected them into a separate work, which he published with the title Lycée, ou cours de littérature ancienne et moderne (Paris, twelve vols. 1799–1805). One of the best of the numerous more recent editions is that published in 1816 in fifteen vols. Among his other works are Tangu et Félime (a poem, 1779); Translations of Camoens' Lusiad (two vols.); the Philoctetes of Sophocles; the Psalms of David and the works of Suetonius; a Commentary on the Dramatic Works of Racine (seven vols. 8vo); the Correspondence with the Czar Paul I.; and a refutation of the opinions of Helvetius.

LA HOGUE, the north-western point of the Peninsula, near Cherbourg, in the department of La Manche. A naval battle was fought here, May 19, 1692, between the French under Tourville and the British and Dutch under Admirals Russell and Rooke, in which the latter were victorious. James II., then living in exile in France, beheld the battle from the neighbouring shore.

LAHORE, the capital of the Panjab, on the left

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bank of the Ravi, 265 miles north-west of Delhi. It is 8 miles in circuit, and surrounded by a brick wall 16 feet high, flanked by bastions. The streets are extremely narrow, unpaved, and dirty; and the houses, though high and built of brick, have in general a mean appearance. Occasionally, however, their wooden balconies and lower windows are elegantly carved. The most remarkable buildings are the mosques of Aurangzeb, built of red sandstone, with lofty minarets and cupolas; of Vizier Khan, covered with painted and lacquered tiles, on which Arabic sentences are inscribed; and of Sonara, conspicuous by the gilding of its minarets and domes; the mausoleum of Runjeet Singh, &c. The bazaars are numerous and animated. The manufactures consist chiefly of mirrors, lacquered wares, silks, and gorgeous shawls flowered with gold and silver thread. An oriental college was opened here in 1871. The attendance at the medical school here is rising every year. Lahore, after being taken by Sultan Baber in 1524, became for a time the seat of the Mogul Empire; in 1748 it fell into the hands of Ahmed Shah, the first Dooranee emperor; and in 1799 was bestowed, with the title of rajah, on Runjeet Singh, who became sovereign of the Sikhs, and selected it for his favourite residence. On the overthrow of the Sikhs in 1849 it passed into the hands of the British. Pop. by the census of 1881, 149,349.

LAIBACH, or LAYBACH (Slovenian, *Ljubljana*), a town in Austria, in the Duchy of Carniola, of which it is the capital. It is situated in an extensive plain, 35 miles north-east of Trieste, on both sides of the river of the same name, here crossed by five bridges. It consists of the town proper, grouped round the castle hill, and of eight suburbs; and is for the most part very indifferently built, with irregular, narrow, and ill-paved streets, but has two rather spacious squares. Its principal buildings are the cathedral of St. Nicholas, with fine pictures, frescoes, and carvings; the old Gothic town-house; the old castle, crowning a height in the centre of the town, and now converted into a state prison and house of correction; the bishop's palace, theatre, barracks, and palace of Count Auersperg. It is the see of a bishop, the seat of government of Carniola, of a military governor, and of several important courts and public offices. The manufactures consist chiefly of woollen and silk goods; and there are oil, paper, and cotton mills, a large sugar refinery, and a considerable transit trade. Laibach is a place of great antiquity, and is understood to occupy the site of the Roman *Æmona*. It makes a considerable figure during the Turkish wars. From 1809 to 1813 it was the seat of government of the Illyrian Provinces, but it is chiefly celebrated in history on account of the congress held here in 1820–21. Its site was at one time very unhealthy, from the extensive morasses which surrounded it; but these have been almost completely drained, and the environs now furnish many fine rides and walks. Pop. 26,284.

LAING, MAJOR ALEXANDER GORDON, one of the many unfortunate explorers of Africa, was born at Edinburgh on the 27th of December, 1793. After serving for several years in the army, he entered in 1822 on his career as an African traveller. In that year he was despatched on two occasions on important embassies to Kambia and the Mandingo country, with the view of establishing commercial relations between the Mandingoes and the colony of Sierra Leone. On his return from the second of these embassies to Sierra Leone he was ordered to join his regiment on the Gold Coast without delay, in a war then going on with the Ashantees, which order he obeyed, after having transmitted details to his friend Captain Sabine, in London, of the geographical determinations of the latitude, longitude, and elevation of the places he had lately visited. In 1824 he was sent home to acquaint government with the state of the Ashantee country and the circumstances of the war. An opportunity having unexpectedly presented itself to him of proceeding, under Lord Bathurst's auspices, in the discovery of the course and termination of the Niger, he gladly embraced it; and it was arranged that he should accompany the caravan from Tripoli to Timbuctoo in the ensuing summer. He left London for Tripoli in the month of February, 1825. He left Tripoli in July in company with the Sheik Babani, whom he afterwards discovered to be no less a personage than the Governor of Ghadamis. After a tedious and circuitous journey of nearly 1000 miles they arrived at Ghadamis; and on the 3d of December reached Ensala, a town said to be thirty-five days' journey from Timbuctoo, and from which he wrote the last letter to his relations in Scotland which they ever received from him. He quitted Ensala on the 10th of January, 1826, and on the 26th of the same month entered on the sandy desert of Tenezaroff. Hitherto only the elements had been his foes, but in the desert he was to enter on a different course of experience. In an engagement with the Tuarics he received no less than twenty-four sabre wounds, and on recovering from his wounds he was seized with fever. On the 18th of August he arrived at Timbuctoo, and made himself acquainted with many interesting particulars regarding that capital of Central Africa. After remaining there about two months he set out on his return, but was assassinated on the way, as it appears by order of the sheik who had acted as his guide, and who had vainly endeavoured to induce him to embrace Mohammedanism (Sept. 1826).

LAIS, the name of at least two celebrated courtesans in ancient Greece. 1. The elder lived in the time of the Peloponnesian war (fifth century B.C.) She began to sell her favours at Corinth for 10,000 drachmas, and an immense number of princes, noblemen, philosophers, orators, and plebeians did homage to her charms. The high price which she demanded of her lovers gave rise to the proverb 'Non cuivis homini contingit adire Corinthum.' 2. The younger Lais was the daughter of Timandra, and a native of Hyccara in Sicily. She is said to have been educated as a hetæra by the celebrated painter Apelles, who was greatly struck with her beauty when he saw her on one occasion drawing water from a fountain. She was no less universally admired than her predecessor of the same name, and it is to her that the observation is ascribed that she did not know what people meant by speaking of the austerity of sages and philosophers, for they were as often found at her door as any others. Her death is said to have been occasioned by a passion which she conceived for a young Thessalian called Hippolochus or Hippostratus, whom she followed into Thessaly, where the women, jealous of her beauty, stoned her to death.

LAIUS. See ŒDIPUS.

LAKE. Lakes are large bodies of inland water having no direct communication with seas or the ocean, or communicating with them only by rivers, by which they pour out their superabundant waters. Some lakes have no issue, and receive no streams; but these are generally very small. Some have outlets but receive no running waters; these are fed by springs which are thus obliged to fill up a basin before their waters can find their way downward towards the lower country. Others receive and discharge large rivers, and sometimes a chain of lakes are connected with each other and with the sea by a series of rivers. This is the case with the great lakes between the United States and Canada, which are really a

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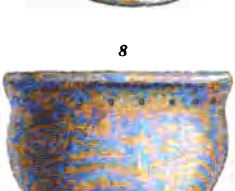

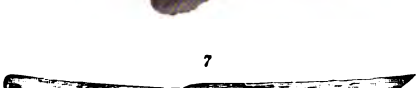

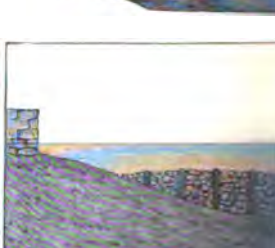

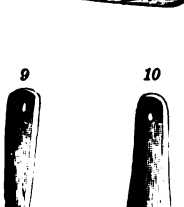

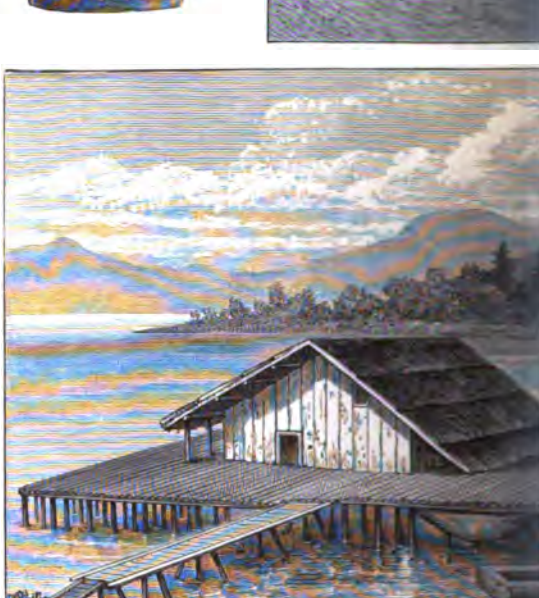

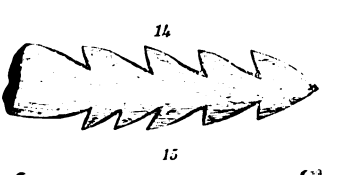

1. Pile Dwellings (restored). *2.* Pile Dwelling in its present state. *3.* Section showing foundation of Pile Dwelling *4.* Or
9, 10. Stone Axes or Adzes. *11, 12.* Scraping Implements. *13, 16.* Implements of unknown use found at Lochlee.
22, Bone Harpoon-head. *24.* Fibula. *25.* Stone Chisel set in Deer-horn. *26.* Bridle bit. *27.* Bronze Spatula. *2*

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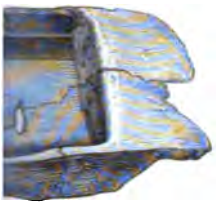

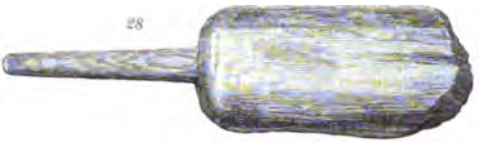

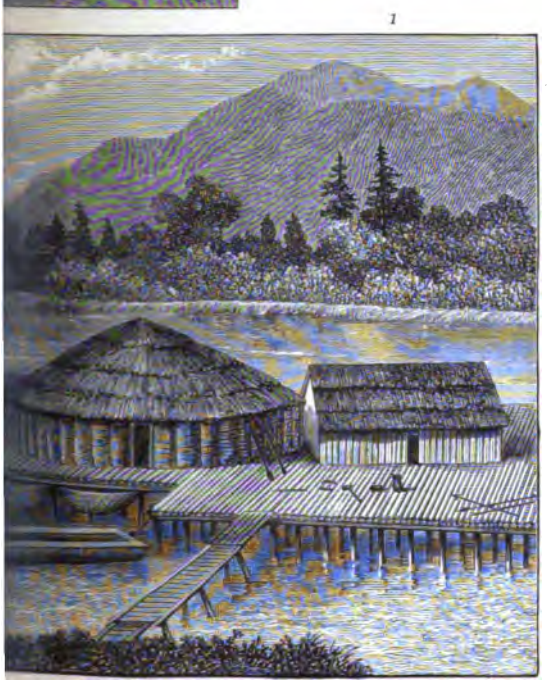

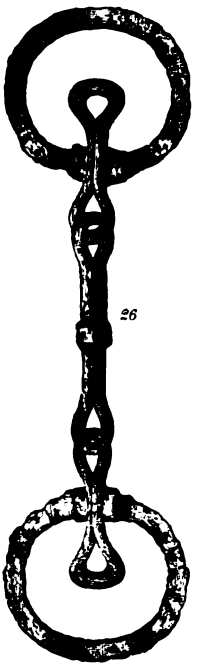

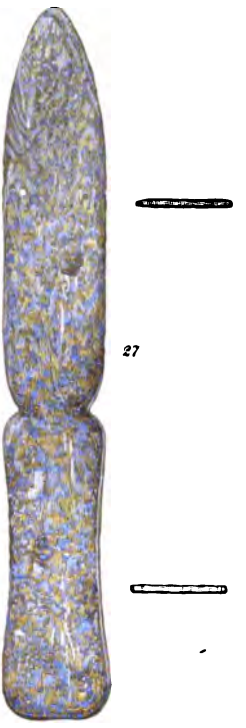

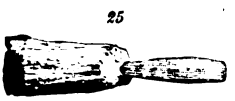

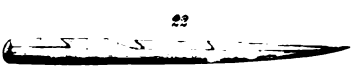

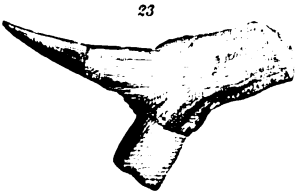

...addle. 5. Stone Wedge with Wooden Handle. 6, 8, 15, 29, 32. Earthenware Vessels. 7, 14. Saw-like Implements (horn and bone).
...2. Stone Wedges fitted in Deer-horn. 18. Bronze Finger-ring. 19. Horn Hook. 20. Bone Spoon. 21. Bone Fish-hook.
...Mallet. 30. Bone Gouge. 31. Stone Pick corded to handle. 33 Wooden Trough.

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series of large basins or reservoirs receiving the accumulated waters of the surrounding countries, and pouring them out through successive channels into other basins situated on a lower level. (See the articles SUPERIOR, HURON, &c.) Another class of lakes receive large streams or rivers, but have no visible or apparent outlet. The Caspian Sea, the Dead Sea, &c., are examples of this kind. These masses of water are in some cases drained by subterraneous streams, and in others are kept at their ordinary level by evaporation. Some lakes are raised to a great height above the level of the sea. Lake Titicaca is 12,493 feet above the ocean. Some again are depressed below the level of the sea. The Dead Sea is upwards of 1300 feet below the ocean. The waters of lakes, though generally sweet, are sometimes salt, such as in the Caspian, the Dead Sea, &c.

LAKE. Pigments consisting of a colouring matter combined with a metallic oxide are called *lakes*. They are obtained by mixing with the solution of the colouring matter a solution of alum or of a salt of tin, tungsten, zinc, or other metal, and then adding an alkali or alkaline carbonate. The precipitate which forms consists of the colour combined with the oxide. Among the pigments prepared in this way may be mentioned *blue* lake, consisting of cobalt blue, indigo, or ultramarine and alumina; *madder* lake, of madder and alumina; *orange* lake, of turmeric and alumina; *carmine* lake, of cochineal and alumina, which is the finest and most important of all (see CARMINE); *purple* lake, of logwood and alumina; and so on. The exact tint depends on the proportions of the ingredients and the mode of preparation, as the lakes do not appear to be definite compounds. Lake pigments are largely used not only in painting, but also in calico-printing, but in the latter the metallic oxide is put upon the cloth, and the colour is afterwards applied.

LAKE DWELLINGS, dwellings constructed on artificial or partly artificial islands in lakes. The use of habitations of this nature is a subject which has engaged the attention of archæologists and others very largely since the discovery of the remains of a lake dwelling in Ireland in 1839, of similar ones in Switzerland in 1854, and subsequently of numbers of others elsewhere. The archæological interest thus attaching to these lacustrine remains has drawn attention to the fact of similar dwellings being still used in various parts of the world, in Russia, the Malay Archipelago (Borneo and New Guinea), the Caroline Islands, Lake Maracaybo in Venezuela, New Zealand, and in a modified form in some parts of Central Africa. The first who is known to have described lake dwellings is Herodotus, who mentions that the Persians in their invasion of Thrace and Macedonia in the beginning of the fifth century B.C. found certain tribes inhabiting Lake Prasias, whose dwellings were constructed on platforms supported above the surface of the lake by piles driven into its bottom. The lake here spoken of is the same as that called by Thucydides Cercinitis, formerly an enlargement of the river Strymon (Struma) at its mouth, now a mere marsh.

The lake dwellings that have hitherto been discovered are built after two chief types, one of which has an Irish name, *crannoge* or *crannog* given to it, from the fact that those of this type are chiefly found in Ireland; and the other of which has a German name, *pfahlbauten* (pile structures), because those of this type were first found in Switzerland. Crannoges are made in the following way:—Great quantities of small stems, sticks, and the like, are collected and sunk by means of stones in the lake, so as to form an island. Very often advantage is taken of the existence of an island just level with the surface of the water, which can be raised a foot or two above the surface with comparatively little labour. Sometimes a few upright piles are driven in on the top after the chief part of the island has been made in the manner described. When the island is thus raised to a sufficient height it is frequently strengthened by an inclosure of stakes driven into the bottom of the lake perpendicularly. A platform of thin stems of trees, either round or split into boards, is then made on the top of the island, and this supports the structures that are built on them. The crannoges of Ireland appear to have been rather used as strongholds than as dwellings. Arms, various implements, and large quantities of bones, have in some cases been found on them. Crannoges are particularly abundant in the county of Monaghan, which contains a number of small lakes scattered over with islets eminently adapted for such constructions. The remains of crannoges have also been found in Scotland, as in Forfar Loch, in Forfarshire, Lochindorb, in Moray, and Loch Cannor or Kinord, Aberdeenshire. In a crannoge discovered at Lochlee, Tarbolton, Ayrshire, and systematically explored in 1878, a great number of relics were discovered, such as an oak paddle (Pl. CXI–CXII. fig. 4), wooden scraper or hoe (fig. 12), thin spiral finger-ring of bronze (fig. 18), hook of horn (fig. 19), small bone spoon with hole worn in the centre (fig. 20), fibula (fig. 24), bridle-bit (fig. 26), bronze spatula (fig. 27), mallet (fig. 28), trough cut from single blocks of wood (fig. 33). The use of the implements represented by figs. 13 and 16 is not certainly known.

Pfahlbauten or pile dwellings are made by driving piles into the lake bottom as a support for the platforms on which the dwellings are erected. They thus resemble those described by Herodotus more than the crannoges of Ireland and Scotland. The piles are sharpened at the lower end, and an examination of the piles themselves shows the sharpening to have been performed partly by heat and partly by some cutting instrument, either of stone, bronze, or iron, as is proved by the fact of such instruments frequently being found on the dwellings. Greater solidity and compactness is sometimes given to the structure of vertical piles by means of stakes transversely inserted between them or notched on to them just below the top. In other cases heaps of stones are thrown down between the upright stakes, forming what is called in Germany a *steinberg*. The upper ends of the vertical piles are brought to an exact level to allow a platform to rest on them similar to that of a crannoge. Coarse gravel was frequently strewed over the platform to keep it dry, and the interstices were often filled up with mud. It was also common to make a hurdle wall round the whole artificial island by means of small branches and twigs interwoven between the outermost stakes. Huts were built on the platform in a similar manner to the rest of the structure. The walls were of stakes bound together by wattles, and covered over by a thick clay, and the roofs were probably thatched. A single platform was in many cases large enough to support a considerable number of huts. In Pl. CXI–CXII. are shown a pile village restored (fig. 1), a pile dwelling in its present state (fig. 2), and the section of a pile dwelling (fig. 3). There can be no doubt that these huts were used as dwelling-places, not merely as strongholds, as the fire-places are still distinctly visible in them, and various appurtenances of domestic economy are found in them. In the lake dwellings of Switzerland relics such as follow have been discovered: stone hammer and axe (figs. 9 and 10), saw-like implement of bone (figs. 7 and 14), earthenware vessels (figs. 6, 8, 15, 29, and 32), stone wedges fitted in deer-horn (figs. 17 and 23), fishhook of bone (fig. 21), harpoon-head of bone (fig. 22), stone chisel set in deer-horn (fig. 25), stone pick

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attached to handle with cord (fig. 31), together with iron and bronze implements, fishing-nets, woollen and linen cloth, personal ornaments, horse-trappings, &c. The fact of bronze and iron implements, cereals, remains of domesticated animals (including the aurochs), and of several manufactured products, being found in the habitations on these lake dwellings, shows that the people who lived in them must have made considerable advances in civilization, but it cannot be exactly determined how old the lake dwellings still in existence are. A description of the crannoges of Ireland will be found in the Proceedings of the Royal Irish Academy, vols. i. v. and vii., and elsewhere. Those of Scotland are described in several vols. of the Proceedings of the Society of the Antiquaries of Scotland. The pile dwellings of the Continent were first described by Dr. Ferdinand Keller, who wrote seven successive papers for the Antiquarian Society of Zürich, giving an account of those first discovered in Switzerland, in January, 1854, namely, those at the village of Obermeilen, on the lake of Zürich, and other similar ones found almost immediately after. The substance of these papers has been issued as a separate work in England under the title, Lake Dwellings of Switzerland and other Parts of Europe: translated and arranged by J. E. Lee, F.S.A., London, 2 vols., 1878.

LAKE OF THE WOODS, a lake on the southern frontier of British America, and partly within the United States territory, 220 miles west of Lake Superior, and 377 feet above its level. It is broken by a long promontory into three distinct portions, of which only the northern is designated the Lake of the Woods, while the eastern bears the name of White Fish Lake, and the southern that of the Lake of the Sand Hills. The whole expanse of water forms a single lake of very irregular shape about 75 miles in length, and varying from 5 to 50 in breadth. The water is tinged a peculiar green colour by an infinite quantity of minute, tubular, needle-shaped confervæ. Rainy River, the principal feeder of the lake, enters it at its south-eastern extremity; its discharge is at the north by the Winnipeg. It abounds with sturgeon.

LAKE SCHOOL, or LAKISTS, a name given usually by way of derision to a class of British poets who came forward conspicuously at the beginning of the present century, and endeavoured to substitute a natural and simple taste for the *classicism* of which Addison and Pope furnish leading examples. They received their name from the picturesque lakes of Cumberland and Westmoreland, where Wordsworth, the Coryphæus of the school, and some others of its leaders, as Southey, Wilson, &c., had fixed their residence.

LAKHNAU. See LUCKNOW.

LAKSHMÎ (Prosperity), in Hindu mythology the wife of Vishnu and the goddess of fortune. She is the female or creative energy of Vishnu, and hence is in many cases regarded as the realistic expression of the attributes of Vishnu. Thus Vishnu is meaning, Lakshmi is speech; Vishnu, righteousness, and Lakshmi, devotion. She is said to have been produced from the ocean of milk when churned by the gods to obtain the beverage of immortality. She was thus born in the full flush of beauty, adorned with a diadem, and with gems on her neck and arms, bearing in her hand a lotus. As soon as she was born she betook herself to the bosom of Vishnu, to whom she ever after clung. According to a later view, that of the worshippers of Vishnu, this god produced three goddesses, Brâhmi, Lakshmi, and Chandika, the first his creative, the second his preserving, and the third his destroying energy. A festival is annually held in honour of Lakshmi, one of the chief observances in which consists in purifying pens, inkstands, and everything else connected with writing, and in abstaining as much as possible from all writing whatever. If any writing has to be done either chalk or charcoal is used instead of pen or reed and ink.

LALANDE, JOSEPH JÉROME LE FRANÇAIS DE, a distinguished astronomer of the last century, was born of a respectable family at Bourg-en-Bresse, in France, July 11, 1732; died at Paris April 4, 1807. After a preliminary training under the Jesuits at Lyons he came to Paris to study law, but applied himself also to mathematics and astronomy, and with such success that in 1751 the Academy sent him to Berlin to determine the parallax of the moon, while Lacaille went with the same object to the Cape of Good Hope. At the sight of so young an astronomer (for he was scarcely nineteen years of age) Frederick the Great could not conceal his astonishment. Lalande, however, proved himself worthy of the choice of the Academy at Paris, and was not only received at court, but was made a member of the Academy of Berlin. After having finished his operations at Berlin, he was chosen member of the Academy of Sciences in Paris in the year 1753. Thenceforward no volume of their Transactions appeared which did not contain some important communications from him; nor did he confine his labours to astronomical subjects merely. The French are indebted to him also for an edition of Halley's Tables, as well as for the historical account of the comet of 1759. For the identifying of this remarkable comet he presented to Clairault the deepest and most ingenious calculations. As the editor of the Connaissance des Temps he entirely changed the plan and management of this useful work, and thereby set a good example to his successors. In 1762 he was appointed professor of astronomy in the Collége de France, where he lectured with immense success to the end of his life. In 1764 he published his Astronomie, a classical work, which was afterwards printed in three volumes 4to and reached the third edition, and of which he made an abridgment (Abrégé d'Astronomie, published at Paris in 1795), a work which cannot be too highly recommended to lovers of this science. In 1765 and 1766 he made a journey to Italy, a description of which (in eight vols. 12mo) contains much valuable information. He was appointed director of the expeditions which were sent out to make observations on the transit of Venus of 1769, but his authority was not recognized in foreign countries, and the expedition of Green and Cook to Tahiti, and that of Hell to Finland, both of which secured valuable results, were undertaken independently. In 1772 Lalande published the results of the calculations based on the observations that had been transmitted to him, and at the same time attempted to throw doubts upon the accuracy of the observations which had been made independently of his directions; but he only succeeded in tarnishing the glory of French astronomy. After the death of Hell he retracted his precipitate judgment. Besides the works already mentioned, Lalande published a Bibliographie universelle avec l'histoire de l'astronomie depuis 1781 jusqu'en 1802 (Paris, 1803). He also composed all the astronomical articles for the great Encyclopédie, and re-wrote them for the Encyclopédie méthodique, and contributed to the Histoire de l'Académie des sciences, the Journal des Savants, the Acta eruditorum of Leipzig, and other periodicals, besides editing for a time, as above stated, the Connaissance des Temps.

LALITA-PATAN, a town in Northern Hindustan, in Nipal, 1 mile south-south-west of Khatmandu, from which it is separated by the Bogmutty. It was formerly the capital of a small independent state. It has a neat appearance, and some handsome public

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edifices; manufactures of cotton, copper, and brass. Pop. 24,000.

LALLY, THOMAS ARTHUR, COMTE DE, BARON DE TOLLENDAL, a brave, but imprudent and unfortunate Irish officer in the service of France. He was of a family which had followed the fortunes of James II., and having entered the French army, he signalized himself so much in the battle of Fontenoy that he was made a brigadier-general on the field of battle. He also drew up the plan of a descent upon Britain, which would have been tried but for the defeat of Charles Edward at Culloden. In 1756 he was selected to restore the French influence in India, for which purpose he was made governor of Pondicherry. It was soon perceived, however, that he wanted the prudence, moderation, and disinterestedness necessary for so distant and critical a scene of action; and after a little partial success against the English in the first instance, he was finally obliged to retire to Pondicherry, which was besieged and taken by the British in January, 1761, the garrison, with Lally, being made prisoners of war. On this catastrophe a torrent of invective assailed the unfortunate leader from all quarters, he having offended everybody concerned by his haughty behaviour and violent temper. He was even accused of having sold Pondicherry to the British, notwithstanding the avowed hatred which, as a Jacobite, he felt for them. He arrived a prisoner of war in Britain, in September, 1761, and, the following month, was allowed to return to France, where, after a long imprisonment, he was brought to trial for treachery, abuse of authority, and unjust exactions. Being found guilty, he was, on the 6th of May, 1766, condemned to be decapitated, which sentence was executed, under circumstances of peculiar ignominy, three days later (May 9). In 1778 his son, Lally-Tollendal, obtained possession of the estates of his father, with a revisal of the proceedings, which were manifestly unjust, Count Lally being one of the victims to public clamour, like Admiral Byng, and many more who have been sacrificed to the unpopularity of an incapable administration.

LALLY-TOLLENDAL, TROPHIME GÉRARD, MARQUIS OF, son of the preceding, born at Paris, March 5, 1751, devoted himself to the military profession. He soon made himself known by his writings in defence of his father's memory, and embraced the cause of the revolution with alacrity, but at the same time with prudence. During the increasing popular excesses he joined his friend Mounier in Switzerland. From hence he returned, but was arrested, and escaped almost by a miracle the massacre of September. He thereupon fled to England, and, while in that country, offered his services as the defender of Louis XVI., but was not accepted. After the 18th Brumaire he returned to France, took an active part in public affairs under Louis XVIII., and was by him called to the chamber of peers, wherein he often defended moderate principles with true eloquence. He was also a member of the French Academy. He died at Paris in March, 1830. He was author of several works on historical subjects, among which are Défense des émigrés, Mémoires concernant Marie-Antoinette, Esai sur la vie de T. Wentworth, Earl of Strafford, besides a tragedy on the same subject.

LAMA, in zoology. See LLAMA.

LAMAISM, a corrupted form of Buddhism prevailing in Tibet and Mongolia, from the Tibetan *Lama*, meaning spiritual teacher or lord, the name given to all the priests of that religion. The origin of this religion is very obscure. According to the legend a religious teacher came from India in the beginning of the fifth century of our era, and settled on Mount Potala, around which the sacred town of Lama grew up. This teacher became the founder of Lamaism. But it would seem to be more probable that the foundation of Lamaism dates from the sixth or seventh century of our era. The highest object of worship among the Lamaists is Buddha, who is not, however, regarded as the creator, but merely, as in Buddhism, as the founder of the religion, and the first in rank of the saints. The other saints comprise all those recognized in Buddhism, besides hosts of religious teachers and pious men, who became canonized after their death. The clergy are the representatives of these saints on earth, and receive the homage due to them. Besides these saints a number of inferior gods or spirits, mainly borrowed from Sivaism, are recognized by Lamaism, and receive a certain worship. The followers of Lamaism are called to worship three times a day by the sound of a little bell. They have three great festivals in the year. The first takes place in February, in celebration of the new year or the advent of spring, and in commemoration of the victory of Buddha Sakyamuni over the six heretic teachers. It lasts fifteen days, which are spent in feasting and revelry. The second commemorates the conception or incarnation of the Buddha, and is held at the commencement of summer. The third is held at the commencement of autumn (in August or September), and is called the water-feast. The soul of a deceased person is believed to fall into the power of Lama, or the infernal judge; and, like the Roman Catholics, the Lamaists believe that it can be released from this species of purgatory only by the saying of masses, which is a great source of profit to the lamas. This is not the only point of resemblance between Lamaism and the Roman Church. There are many others, in organization as well as in discipline and ritual, which are probably to be explained by the fact that at one time Christianity was widely spread in those regions now subject to Lamaism. The Lamaists have a hierarchy resembling that of the Roman Church; they have monasteries and nunneries, auricular confession, intercession of the saints, fasting, washing of the feet, litanies, and lustral water. In the Lamaistic hierarchy there are two heads, each supreme within his own territory. One of these is the Dalai-lama, that is, ocean-priest, or priest whose sway is wide as the ocean; and the other the Tesho-lama, Bogdo-lama, or Pan-chhen. The former has his residence at Potala, near Lassa, and as his territory is far more extensive than that of the other, he is by far the more powerful of the two. Next in rank to the two supreme lamas come the Khutuktus, who are charged with the spiritual government of the provinces, and who resemble the Roman Catholic cardinals not only in their functions, but even in the insignia of their office. Below them are the Khubilghans or Hobilghans (in Tibetan called *Bjang chhub*). These are the three grades that are held to be incarnations of the Buddhistic saints. When any of the clergy die their place is filled by children, into whose bodies their souls are supposed to have migrated, and who are chosen at the age of from two to five, and trained up for the position which they are destined to occupy. The right of determining what child has received the body of a departed priest properly belongs to the members of the grade to which he belonged. When the Dalai-lama or Pan-chhen dies his place may be filled according to directions given by himself before his death, stating into what family he purposed migrating. If such directions have not been given recourse must be had to the sacred books, traditions, and oracles as guides, and in the interpretation of these the Dalai-lama acts for a deceased Pan-chhen, and the Pan-chhen in similar circumstances for the Dalai-

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lama. Such ought to be the methods adopted in finding successors for the lamas, but in fact the appointments, at any rate to the highest offices, are made under the influence of the Chinese government. In addition to these three grades of clergy, who are held to be incarnations of Buddhistic saints, and chosen in the manner just described, there is a lower grade of priests, not regarded as incarnations, who are chosen solely on the ground of their own merit and theological attainments. They are all bound by a vow of celibacy, and mostly live in monasteries.

LAMANTIN. See MANATEE.

LAMARCK, JEAN BAPTISTE PIERRE ANTOINE DE MONET, CHEVALIER DE, was born in the year 1744, in Picardy, of a noble family; died at Paris in 1829. He entered the army in 1760, and distinguished himself in the campaign in Germany in 1761, but was compelled, on account of an accident, to abandon the service, after which he devoted his attention to study. He applied himself at first to medicine; afterwards, in consequence of hearing Jussieu's illustrations of botany, was led to the study of natural science. Jussieu, on a botanical excursion, in which Lamarck accompanied him, had intimated that the old method of instruction in this department left much to be wished for, and Lamarck determined to remedy this deficiency. He laboured with great diligence on a treatise in which he showed the defects of the old system, and proposed a new one himself, which met with universal approbation. He then applied his new system to the plants of France, and delivered to the Academy his Flore Française, ou Description succincte de toutes les Plantes qui croissent naturellement en France. This work was printed, by the recommendation of the Academy, at the expense of the government, for the benefit of the author (1780, under the date of 1778, in three vols.; second edition, 1793; and the third, enlarged and revised by Decandolle, 1805–15). Lamarck now turned his whole attention to this science, and made several botanical excursions to Auvergne, and into Germany, in the last of which he was accompanied by the son of the great Buffon. On his return to Paris he undertook the botanical department of the encyclopædia which Panckoucke was publishing, and applied himself to this task with such assiduity, that, in 1783, he produced the first half of the first volume, with an introduction, containing a sketch of the history of the science. He published the second volume in 1788. But a dispute between him and the publisher, in regard to the admission of certain articles, brought the undertaking to a stand, and there ended Lamarck's botanical career. Many of his botanical treatises were published in the Memoirs of the Academy, and in the Journal d'Histoire naturelle, edited by him, together with the Abbé Haüy, Fourcroi, Bruquière, Oliver, and Pelletier, which make us regret that their author ever abandoned this branch of science. At the breaking out of the revolution he was the second professor in the royal *jardin des plantes;* but in consequence of new arrangements he received a chair in the department of zoology, in which he was soon as much distinguished as he had been in botany. His Système des Animaux sans Vertèbres, ou Tableau général des Classes, des Ordres, et des Genres, de ces Animaux (one vol. Paris, 1801); his Philosophie zoologique; and his Histoire naturelle des Animaux sans Vertèbres, are his principal works in this department of science. Lamarck's comprehensive mind was also directed towards physics, and he published in 1794 Recherches sur les Causes des principaux Faits physiques, in which he exposes many false theories in this science. With the same view he also wrote his Refutation de la Théorie pneumatique, &c., which appeared at Paris in 1796. He collected his meteorological observations in his Annuaire météorologique, 1799–1809.

LAMARTINE, ALPHONSE MARIE LOUIS PRAT DE, a French poet and statesman, born at Mâcon, Oct. 21, 1790; died at Passy, near Paris, in 1869. After being educated at the Jesuit school at Belley he spent some years in the country and in travelling, without any definite occupation, devoting himself chiefly to poetry. By his first production, Méditations poétiques (Paris, 1820), he at once obtained a high place among the poets of the day. This induced the court to attach the new celebrity to itself, and Lamartine became attaché to the embassy at Naples. A considerable fortune, which he acquired by marriage with a rich English lady, secured him thenceforward the enjoyments of an aristocratic life, and plenty of leisure for his favourite pursuit. The Nouvelles méditations poétiques (1823) and the Harmonies poétiques et religieuses (1828), established his poetic fame, and obtained for him admission into the French Academy (1830). After the revolution of July he remained for a time aloof from public life, and undertook a journey to the East. His travels, which were conducted in a princely style, lasted sixteen months, and on his return he published an account of them in a work entitled, Voyage en Orient, souvenirs, impressions, pensées et paysages (Paris, four vols. 1835). During his absence he had been elected a member of the Chamber of Deputies, but he connected himself with none of the parties which divided the chamber, and in his speeches confined himself to non-political subjects. He still continued to write poetry, but his next poetical productions, Jocelyn (1835), La chute d'un ange (1838), Recueillements poétiques (1839), as they exhibited a marked falling off from his earlier performances, were received by the literary world with increasing coldness, which induced him to give up poetical composition altogether. In the Chamber of Deputies, on the other hand, where he represented his native town till 1848, his fame as a political orator was steadily increasing. Holding what may be called liberal-conservative views, he was for a time the head of a small independent party calling itself *Le parti social*, which, regarding with indifference all purely political questions, aimed at the elevation of the people by a system of legislation based on philanthropic and religious principles. In the beginning of his political career he nevertheless usually voted with the government, but was at last driven over to the opposition by the reckless obstinacy with which the government opposed all reforms. In 1847 he published his Histoire des Girondins (Paris, eight vols.), in which he manifested strong republican leanings. After the February revolution of 1848 he became a member of the provisional government, in the capacity of minister of foreign affairs. He was elected by ten departments a member of the constituent assembly, by which he was chosen a member of the executive committee. For some months he enjoyed unbounded popularity, and his energetic behaviour was on more than one occasion the means of averting incalculable evils. His relations with Ledru-Rollin gave the first blow to his favour with the people, which the disturbances of June converted into hatred. The tracts which he published in defence of his conduct (Trois mois au pouvoir, Histoire de la Révolution de 1848) were of no avail, and on the occasion of the elections to the Legislative Assembly in 1849 he was rejected even by the department in which his native town stands. The place which he obtained in the last republican assembly was due to an after-election at Orleans. In consequence of the *coup d'état* of Dec. 2, 1851, he withdrew from public life. By this time the extra-

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vagance of his mode of living had straitened his circumstances considerably, which made him resort to many means of raising money which were scarcely creditable to him, such as raising subscriptions and setting up lotteries for his benefit; and, above all, writing a multitude of books with extreme haste, and without preparation (Confidences, 1849; Nouvelles confidences, 1851; Histoire de la restauration, eight vols. 1851–53; Histoire de Turquie, six vols. 1854; Histoire de Russie, two vols. 1855; Le Conseiller de peuple, 1849–50; Le Civilisateur, 1851; Esprit de Mme. de Girardin, 1862; Shakspere et son œuvre, 1864; Vie de Tasse, 1866; Antoniella, 1867, &c. &c.) His Mémoires appeared in 1871. His biography has been written by Pelleton (1869) and Janin (1869).

LAMB, CHARLES, born in London in 1775; died at Edmonton, Dec. 27, 1834. He was son of a clerk to one of the benchers of the Inner Temple. Having entered Christ's Hospital at the age of seven, he remained in it till his fifteenth year, and had among his schoolfellows Coleridge, with whom he formed an intimacy which lasted for life. On leaving the hospital he was employed for a short time in the South Sea House, from which he removed in 1792 to an appointment in the accountant's office of the East India Company. Here he remained till 1825, when he was permitted to retire on a pension of £450. The whole course of his domestic life was devoted to the safe-keeping and care of his sister Mary, who in a fit of acute mania had stabbed her mother to the heart in 1796. He died in 1834. His first appearance as an author was in 1798, when he published a volume of poems in conjunction with his friends Coleridge and Lloyd. It met with little success. He was not more fortunate with a tragedy entitled John Woodvil, written in imitation of the early English dramatists; and a farce entitled Mr. H., which was performed at Drury Lane in 1806, and proved a failure. On the other hand, his tale of Rosamund Gray (Lond. 1798) was well received when it appeared, and is still a favourite with those who have a taste for Lamb's writings. In 1807 he wrote, in conjunction with his sister, a series of Stories from Shakspere, Mrs. Leicester's School, and the Adventures of Ulysses. All these proved very popular books for children. In 1808 he published specimens of English dramatic poets who lived about the time of Shakspere, with notes, in which he draws attention to the simplicity and purity of the diction of the dramatists of that period. Almost all his other productions were communications to different periodicals of his day. By far the best-known appeared first, chiefly in the London Magazine, under the name of Elia. They have been frequently republished in a collected form. Here, in a style ever happy and original, and with wit of the rarest and most pungent description, he has carried the short humorous essay to a point of excellence perhaps never before attained. The works of Charles Lamb, including his essays, letters, poems, plays, and final memorial by T. N. Talfourd, were published in London in 1852. A more complete edition by Fitzgerald was published in six vols. (1870–76).

LAMBAYEQUE, a town in Peru, near the mouth of the river of the same name, in the department of Libertad, 120 miles north-west of Trujillo. It manufactures woollen and cotton fabrics. The roadstead opposite the town is the worst anchorage on the coast of Peru. Pop. 10,000.

LAMBERT, DANIEL, noted for his extraordinary corpulence, was born in Leicester on 13th March, 1770, but up to his nineteenth year gave no indications of the remarkable stoutness which he afterwards attained, being an enthusiastic follower of field sports and athletic exercises. Having succeeded his father as keeper of the Leicester prison he exchanged an active for a sedentary life, and from this time rapidly increased in size till he became quite an object of public curiosity, and attracted visitors from all parts of the country. He now resolved to turn his obesity to account, and in 1806 commenced an exhibition of himself in Piccadilly, London. He afterwards exhibited himself in the principal towns of England. At the period of his death which took place on 21st June, 1809, in his fortieth year he was 5 feet 11 inches in height, weighed 739 lbs., and measured 9 feet 4 inches round the body, and 3 feet 1 inch round the leg. In diet he was remarkably abstemious, drank water only, and never slept more than eight hours.

LAMBERT, JOHANN HEINRICH, an eminent mathematician and astronomer, was born at Mühlhausen, a town then in alliance with the Swiss cantons, August 29, 1728. His father was a tailor in humble circumstances, who intended him for his own business; but being sent to a public school, he so distinguished himself that an attempt was made to provide him with the means of studying theology, which, however, proved unsuccessful, and he was obliged to follow his father's employment. In this situation he spent the greatest part of the night in study, and obtaining an old mathematical treatise, discovered so much ardour and ingenuity that several learned men were induced to instruct him gratis. He acquired a knowledge of mathematics, philosophy, and the oriental languages in his native place. He afterwards became clerk to some iron-works, and amanuensis to Professor Iselin of Basel who conducted a newspaper, and became his sincere and constant friend. Iselin afterwards recommended him to Baron Salis, president of the Swiss Convention, to become tutor to his children; and aided by the excellent library of his new patron, and the scientific intercourse which he met with in his circle, he enlarged the sphere of his aquirements in an extraordinary degree. In 1756 he accompanied his pupils to Göttingen, in the following year to Utrecht, and in 1758 to Paris, Marseilles, and Turin. In 1759, in which year he became released from his tutorial duties, he went to Augsburg, and afterwards lived in Munich, Erlangen, Switzerland, and Leipzig till 1764, when he went to Berlin, where Frederick the Great appointed him to the head of the building council, and made him a member of the Academy of Sciences. He enriched the transactions of various societies with his papers and treatises, all of which bear the stamp of eminent and original genius. Most of his mathematical pieces were collected in three volumes by himself. His death took place September 25, 1777. Philosophy, and especially analytic logic, are greatly indebted to him for his Novum Organon, or Thoughts on the Examination and Relations of Truth (Leipzig, 1764, two vols.), and his Architektonik, or Theory of the First Simple Principles in Philosophical and Mathematical Knowledge (Riga, 1771, two vols.)

LAMBERT, JOHN, one of the parliamentary soldiers in the civil war, was born of a good family about 1620, and educated for the bar, but quitted it for the army, and had attained the rank of colonel in 1644, when he fought against the king at the battle of Marston Moor. He stood high in favour with the Independents, and accompanied Cromwell into Scotland in 1650, where he distinguished himself by great gallantry. He took the lead in the council of officers who gave the protectorate to Cromwell, but he afterwards fell into disgrace, and was deprived by Cromwell of all his commissions, though a pension of £2000 was allowed him for past services. This

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seems to have purchased his silent acquiescence in all Cromwell's proceedings; but when Richard attempted to assume the protectorate he again came forward, and became the head of the Fifth Monarchy Men, or extreme republicans. In 1660 he set out for the north to encounter Monk, but was deserted by his troops, seized, and committed to the Tower. His escape shortly after caused considerable alarm, and threatened to lead to a renewal of the civil war, but he was apprehended before he had succeeded in assembling any considerable body of troops. At the Restoration he was excepted from the act of indemnity, brought to trial, and condemned, but saved his life by abject submission, and was banished to Guernsey, where he survived for more than thirty years, and at last died, it is said, a Roman Catholic.

LAMBESE, Lambessa, or Lambæsa, an ancient city in Northern Africa, one of the most important towns of Numidia, belonging to the Massylii, now a ruin. It lies 6½ miles east of the modern Batana, and 62 miles south-west of Constantine, in the French territory of Algeria. The Berber name of this ancient Roman city is Enchir-Tezzoulet. In the time of the Roman Empire it was the station of the Legio tertia Augusta. The existence of the ruins of Lambese was scarcely known, and scholars did not even know the exact district in which they ought to be looked for, when they were accidentally discovered in February, 1844, by an officer in the French service called De la Mare, who happened to form part of a column of French troops which were engaged in an expedition in that quarter. He found a large number of interesting remains of antiquity—more than had been furnished by any other town in the Roman Empire except Rome itself; and he published an account of his researches in the Revue archéologique, and afterwards in the Mémoires de la Société des antiquaires de France. Among the more remarkable of the ruins were an amphitheatre measuring upwards of 300 feet in length, and capable of containing 10,000 persons; a triumphal arch, a temple of Æsculapius with Doric columns, walls of limestone of various colours, mosaics, marble staircases, statues, thermæ, aqueducts, &c. Soon after its discovery it was selected as a place of deportation for political offenders, and as it was feared that injuries might in consequence result to the archæological remains, the discoverer of the ruins, De la Mare, was sent out to make a collection of the inscriptions, and returned with no less than 1420, the text of which may be read in the Recueil des inscriptions romaines de l'Algérie.

LAMBETH, a suburb of London, on the Surrey side of the river Thames, opposite to Westminster. Here is a palace belonging to the Archbishop of Canterbury, a very large pile of building, and containing a library of 25,000 volumes and upwards of 1200 manuscripts. In recent years Lambeth has become famous for its potteries, and the new St. Thomas's Hospital has been recently erected here. Pop. of the parl. bor. in 1881, 499,255. See London.

LAMEGO, a city of Portugal, in Beira, in a plain near the Douro, surrounded by mountains, 36 miles east of Oporto. Here Affonso Henriques is said in 1143 to have held the first Portugese cortes, which regulated the succession to the crown. Pop. 8124.

LAMELLIBRANCHIATA (Latin, *lamella*, a thin plate; Greek, *bragchia*, gills), a class of the higher Mollusca, represented by the oysters, mussels, cockles, &c., which are distinguished by the possession of a bivalve shell, the absence of a distinct head, and the presence of four lamellar or plate-like gills. In the lamellibranchiate molluscs there is further no *odontophore* or tooth-like apparatus contained within the mouth. The majority of Lamellibranchiates are marine, but the class possesses freshwater representatives also. See Mollusca.

LAMELLIROSTRES, a family of the Natatores or Swimming Birds, distinguished by the flat form of the bill, which is invested by a soft skin, and provided at the edges with a set of transverse plates or 'lamellæ,' through which the mud, in which those birds grope for food, is sifted or strained. This latter feature has thus given the family its technical name. These lamellæ, together with the soft outer skin of the bill, are supplied with nervous filaments, and are endowed with acute tactile sensibility. The toes are arranged three forwards and one backwards, the front toes being webbed and the hinder toe free. The body is in general heavy, the gait in the most part being slow and awkward. The wings are of moderate size and power. The windpipe of the male birds exhibits a contorted or twisted arrangement in its lower part; this structure serving to produce the hoarse notes of those birds, whilst the conformation of the trachea also assists in the distinction of the species. The tongue is large and fleshy; and a large and muscular gizzard is present. The Lamellirostres are for the most part inhabitants of fresh waters, from the shallower depths of which they obtain the worms, larvæ, &c., upon which they subsist. Some forms, however, are more purely vegetable feeders. The Lamellirostral Natatores correspond with the family Anatidæ of the older classifications; and the chief groups included in this division are those of the Ducks (Anatidæ), Geese (Anserinæ), Swans (Cygnidæ), and Flamingoes (Phœnicopteridæ).

LAMENNAIS, Hugues Félicité Robert de, born in 1782 at St. Malo of a wealthy mercantile family which was ruined by the revolution. In 1814 he went to Paris, and was obliged to live in very poor circumstances. His family connections, as well as his own private sentiments, made him a zealous supporter of the restoration, and he hence, during the Hundred Days, emigrated to England, to maintain himself there by teaching. After a seven months' residence in England he returned to France, entered the seminary of St. Sulpice at Paris, where he remained for a short time, and in 1816 became a curate at Rennes. He had, eight years before, commenced his career as a writer by publishing Reflexions sur l'État de l'Église en France pendant le dix-huitième siècle, et sur sa Situation actuelle, a work which was suppressed by the imperial police. From 1808–30 he published translations of ascetical writings; treatises on religious, philosophical, and political questions; views as to the past and actual condition of the church, as to the French system of education, and as to the influence of philosophical degrees. Among these works particular notice is due to the Essai sur l'Indifférence en Matière de Religion (four vols. Paris, 1817–20), which is a brilliant apology for Roman Catholicism, and gave its author a place among the most eminent writers of France, attracting universal notice. During this time he distinguished himself as a zealous defender of authority in opposition to freedom in matters of belief, maintained the necessity of an absolute theocracy, and advocated the doctrine of Gregory VII. as to the subordination of the authority of princes to that of the pope. The toleration given by the French charter to all forms of worship was in his eyes a culpable countenancing of heresy, and every variation from Papal belief a criminal schism. Lamennais stood in close connection with all the royalist leaders of the period; and out of his union with Châteaubriand, Bonald, Frayssinous, Castelbajac, Fiévée, Villèle, &c., arose the Conservateur, whose whole force was directed against the ministry of Decazes. At a later period he contributed to the

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Defenseur and the Drapeau Blanc. An attack made by him in the last in 1823, on the public system of education, subjected him to a prosecution, and his publisher to a fine. In 1824 he made his first journey to Rome, where he was received with distinction by Leo XII., but refused a cardinal's hat, which he earnestly desired. After his return he published his La Religion Considérée dans ses Rapports avec l'Ordre Civil et Politique (two vols. Paris, 1825–26), in which he made a reckless attack on the famous declaration of 1682, the bulwark of the liberties of the Gallican Church. He was in consequence carried before the criminal police court, and notwithstanding the brilliant speech of his advocate Berryer, condemned, though only in a fine of 36 francs. From this time he began to preach the separation of church and state, as he believed he could only deliver the former by freeing her from the yoke of the latter. How quickly these new views developed themselves in him appeared from his work Progrès de la Révolution et de la Guerre contre l'Église (Paris, 1829), in which he almost distinctly foretold the revolution of the following year. On the outbreak of the July days of 1830 he became a convert to the dogma of the sovereignty of the people. In September of that year he began to publish his L'Avenir, which had for its motto, 'God and Freedom.' This journal advocated the absolute independence of the Roman Catholic Church, and its formal separation from the state. It would renounce all its emoluments from government, to be mistress of its worship, its education, and its discipline, and would by means of freedom work out its regeneration. These theories aroused at once the opposition of the French government and the suspicion of the Papal court. Pope Gregory XVI., by an encyclical letter, 15th August, 1832, condemned the views and doctrines of the journal L'Avenir. The following month Lamennais gave it up, and in December, at the particular request of the pope, subscribed a declaration in which he pledged himself exactly to follow the orthodox doctrines of the Catholic Church. How far this promise was a mere empty form appeared in 1834 by his publication of Paroles d'un Croyant. This book, which produced an almost unexampled sensation, passed in a few years through more than 100 editions, was translated into almost all living languages, and reprinted in almost all foreign countries. Since Bossuet the French language had never been wielded with such calm might, with such majestic purity. To the encyclical letter of 7th August, 1834, in which Gregory XVI. condemned the book, Lamennais answered by the Affaires de Rome (Paris, 1836), in which he declared that the tendencies of the holy see were adverse to every natural and Christian right. His breach with Rome was now incurable. Disavowed and scouted by the clergy, persecuted by the temporal power, and lauded by the democracy as an apostle, he now worked without restriction for radicalism. From February to June, 1837, he stood at the head of the radical daily paper called Le Monde, in which, however, he did not particularly distinguish himself. The same year appeared his Livre du Peuple, which, both in style and thought, bears considerable resemblance to the Paroles d'un Croyant. His next political writing, Le Pays et le Gouvernement (Paris, 1840), became somewhat famous, partly because it subjected its author to a year's imprisonment and a fine of 2000 francs, and partly because the new measures of the government as to the press made the pamphlet a kind of rarity. Lamennais having now arrived at a negative belief, did not long remain in it, but continued to sink deeper and deeper till he appeared to have lost sight both of religion and morality, and arrived at a union of atheism and socialism. After the February revolution of 1848 he became a member of the constitutional and legislative national assembly, where he took his seat on the left. The re-establishment of the empire under Louis Napoleon appears to have disappointed all his expectations, and he lived afterwards in retirement and comparative poverty till 1854, when he died.

LAMENTATIONS. See JEREMIAH.

LAMMAS, originally a festival of the ancient Britons, celebrated on the 1st of August, probably in token of joy at the ingathering of the harvest, subsequently adopted, in accordance with the usual practice of the early church, as an ecclesiastical festival. Its name is probably a corruption of *Hlaf-mass*, that is, *Loaf-mass*, a name given to it from the circumstance that a loaf was the usual offering made by our ancestors on that day. The 1st of August, as Lammas-day, is now the second of the four cross terms of the year.

LÄMMERGEIER (*Gypaëtos barbatus*), a species of rapacious bird connecting the eagles with the vultures, distinguished by its great size and by the beard or tuft of bristle-like hairs rising at the nostrils and depending from the bill, and by the head and neck being feathered instead of naked, as in the true vultures. It is the largest bird of prey in the Old World, measuring nearly 4 feet in length, and sometimes as much as 10 feet in alar extent. It is of a grayish-brown colour above, with a streak of white running down the middle of each feather, and of a much lighter colour, almost white, on the under surface of the body and on the neck. The young bird is much darker hued, and has hence been sometimes erroneously classed as a separate species. The lämmergeier is a comparatively rare bird. It inhabits the lofty mountain chains of Europe, and builds its nest on precipitous rocks. It feeds on carrion, but also attacks living animals, such as goats, lambs, &c., which it strikes with its wings from the precipices on which it sees them browsing. Its talons are not so powerful as to enable it to carry off such animals with ease, although it is sometimes said to do this. The name of bearded vulture is also given to it. 'Lämmergeier' is German, and signifies lamb-vulture. (See Pl. CXLVI. CXLVIII.)

LA MOTTE, JEANNE DE VALOIS, COMTESSE DE, rendered notorious by the affair of the necklace, was a descendant of the family of Valois by an illegitimate child of Henry II. Until the affair of the necklace she had lived in penury and contempt, although she had employed all the arts of immorality and intrigue to procure for herself rank and wealth. Being thus known to a great part of the nobility of Versailles and Paris, she astonished all who were acquainted with the circumstances of her fortune, when, in 1784, she suddenly began to display an extravagance which could only be supported by great wealth. An intrigue soon became notorious, which attracted the attention of all Europe. The Prince Louis de Rohan, cardinal bishop of Strasburg and grand almoner, had fallen into disgrace, of which the reasons were not very satisfactorily known. The Comtesse de La Motte, informed of the desire of the cardinal to recover favour at court at any price, had falsely represented to him that the queen, with whom she pretended to have a great though secret influence, wished to possess a costly necklace which was offered for sale, but at that time was not able immediately to advance the sum requisite for the purchase. If, therefore, he would purchase the necklace in his own name, and allow the queen to repay him by instalments, he would by so doing regain favour. The cardinal fell into this snare, purchased the necklace, and gave it to the Comtesse de La Motte, to be

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delivered by her to the queen. A bond, forged by the countess, was then given him for his security, settling the conditions of payment. In order to deceive the cardinal the more perfectly the countess had concerted with a woman who was privy to the plot that she should appear to him under the mask of the queen in August, 1784, in the gardens at Versailles, and present him a box containing a rose and the queen's portrait. The time when the cardinal had promised to pay for the necklace now came, and as he did not possess money sufficient for the purpose, he informed the jewellers that the necklace was purchased for the queen. The jewellers, after waiting a long time without obtaining their money, applied to the queen herself, and thereby gave a clue for the detection of the fraud. By the sentence of parliament the deceived cardinal was acquitted, and the Comtesse de La Motte, convicted of having embezzled and sold the necklace, was sentenced to be branded, scourged, and perpetually imprisoned. At the end of two years she escaped from confinement (1787), and fled to England, where, in conjunction with her husband, who had there sold the necklace, she published a pamphlet against the court of Versailles, and particularly against the queen. Villette and Cagliostro, who had taken part in the deception, were banished the kingdom. The fate of the Comtesse de La Motte has not been ascertained with certainty, but it seems to be most likely that she died in London in 1791 from injuries received by falling from a window.

LAMOV, or LOMOV, the name of two towns in Russia, in the government of Penza.—1. NIJNEI-LAMOV (Lower Lamov), 65 miles W.N.W. of the town of Penza, with a large annual fair, which attracts dealers from all the provinces of the empire. Pop. 18,850.——2. VERKNEI-LAMOV (Upper Lamov), about 9 miles south-west of the first. Pop. 8414.

LAMP. The ancients appear to have very early acquired the practice of using lamps. The use of oil was not perhaps known to the Romans in very remote ages, although the Greeks unquestionably were acquainted with it, as appears from several passages in Herodotus. We find, indeed, the figure of the lamp sculptured and engraved on many of the most ancient Greek vases. It is with a lamp that Hermes, as depicted on one of these, lights Zeus, who is represented scaling with a ladder the chamber of Alcmena. Baked earth was the substance of which the earliest lamps were composed, but subsequently we find them of various metals – of bronze more particularly. A few ancient lamps of iron are also extant, but these are rare, either because that metal was little used for the purpose, or on account of its more ready destruction in the ground. Pausanias mentions a golden lamp in the temple of Athēna, and St. Augustine speaks of lamps of silver. No antique of either kind, however, has reached modern times. The lamps or candlesticks made use of by the Jews in their own houses were generally put into a very high stand on the ground. The candlestick with seven branches, placed in the sanctuary by Moses, and those which Solomon afterwards prepared for the temple, are said to have been crystal lamps filled with oil, and fixed upon the branches. Among the Romans also it was customary to have the lamp either depending from the ceiling or placed on a stand in the room. These stands were often highly ornamented. The most common form of them was a tripod with lion's feet, from which sprang sometimes the shaft of a column, according to one of the orders of architecture, the disk placed to receive the lamp forming the capital. These vessels were generally ornamented with mythological or allegorical subjects, and their shape varied greatly. Sometimes it was a simple disk with a hole in the circumference through which to pass the wick, and another in the middle to pour the oil into. At other times they presented the appearance of a boat. Occasionally their extremity terminated in two or three divisions, according to the number of beaks; but it would be endless to attempt to pursue these details. Inscriptions were likewise often found placed upon them. Public illuminations on occasions of national rejoicing were common among the Romans. On the birth-days of their princes, on great religious solemnities, &c., they suspended lamps at the windows. Juvenal and Persius both make mention of this usage. Various motives have been assigned for the ancient practice of placing lamps in sepulchres. One of the most ingenious, and perhaps the most satisfactory, is that it was allegorical of the cessation of mortal life—of the separation of the soul, which the ancients regarded as an emanation of fire. On some sepulchral lamps we find sculptured the figure of the butterfly, in allusion, no doubt, to the equally cheerful and elegant imagination of the escape of the spirit, in a more aerial semblance, from its chrysalis state. The early Christians adopted in their monuments this pagan usage, together with many others, and the lamp has been found in the tombs of saints and martyrs, and of distinguished men who embraced Christianity. In these instances it was no doubt meant still more to be illustrative of that divine flame by which they were inspired, and whose inward light guided them through the many savage persecutions suffered by the primitive followers of our holy faith. The shapes of ancient lamps, as well as other ancient utensils, have been imitated with much success by Mr. Wedgwood.

We now come to speak of the construction of the lamps of modern times, but before describing these it will be necessary to say a few words on the nature of flame. The requisite properties of a perfect lamp are these:—1st, It must be supplied with carbonaceous matter and with oxygen; 2d, It must convert the former into a gaseous state; and 3d, It must bring the gas so produced in contact with oxygen, at such a temperature that the carbon will combine with the oxygen in the fullest degree to produce the greatest quantity of flame without any smoke. Until 1784 all the lamps in use were far from meeting all these requirements. The great defects of the lamps previous to that date were, first, that the wick being thick, the air could only come into contact with a comparatively small portion of the flame, the consequence of which was that the consumption was incomplete, and smoke was produced; and secondly, that no means was employed to keep the oil supplying the wick constantly at the same level, so that the supply of oil diminished the longer the lamp burned, and thus the intensity of the light constantly decreased. But in the year mentioned these two great defects were rectified in a lamp constructed by Aimé Argand of Geneva, and called after him the Argand lamp. The defective consumption is remedied by using a circular wick, the flame of which is nourished by an internal as well as an external current of air, and by placing a glass chimney above the flame so as to increase the draught. This latter improvement was due to an accidental discovery made by Aimé Argand's brother. Equality of supply was secured in the following way: The wick is fed with oil by means of a tube proceeding from a separate vessel, in the inside of which is another vessel communicating with the former by means of an opening at the bottom, and closed at the top with a lid. The interior vessel is on the principle of the bird fountain. When filled it is taken out of the

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larger vessel and turned upside down, and the oil is poured in by the opening at the bottom. This opening is then closed, and the vessel restored to its original position inside the larger vessel. From the construction of the smaller vessel, and the manner in which it is filled, by which air is excluded from the interior, it will be evident that when it is brought into communication with the outer vessel, which is also filled with oil, and in which the oil is exposed to the pressure of the atmosphere, the inner vessel will be able to contain a certain amount of oil above the level of that in the outer vessel. Accordingly, when the smaller vessel has been filled, and replaced in the interior of the larger one, the covering is withdrawn from the opening at the bottom of the former, and the communication is thus established between the inner and outer vessel. As the lamp burns, then, the oil in the outer vessel is gradually conveyed away and consumed until it sinks to the level of the opening of the inner vessel, which is exactly at the level of the burner. But as soon as the oil in the outer vessel sinks to the smallest extent below the level of the opening referred to, a bubble of air will pass up into the inner vessel, and force out a sufficient quantity of oil to raise the level of that contained in the outer vessel sufficiently to exclude any further admission of air. This goes on until the oil in the inner vessel is exhausted, and the result is, it is plain, that till this happens the wick is fed as nearly as possible with a uniform supply of oil. In the improved lamps that have succeeded that of Argand, the Argand burner has generally been retained, and the alterations have chiefly been made in the mode of keeping up a uniform supply of oil. One of the earliest and best of these improvements is that of Carcel, a clock-maker of Paris, who invented a new kind of lamp in 1800. In Carcel's lamp there is a large reservoir of oil at the bottom of an upright tube which supplies the wick. The reservoir is divided into three compartments by two horizontal partitions, in each of which there is a pair of valves opening upwards. In the middle compartment a piston moved by clock-work oscillates horizontally, at each movement opening a different pair of valves in such a manner that one valve admits the oil into the upper compartment, into which it is forced by the piston, while by the other valve a supply of oil enters from the lower compartment to fill the space left vacant as the piston retires. It scarcely needs to be pointed out that the same action which forces the oil into the upper compartment of the reservoir causes it to rise in the tube which supplies the wick. The chief advantage which this form of lamp has over that of Argand consists in the avoidance of the shadow which in the latter is thrown from the vessel containing the supply of oil. The form in which this lamp is most commonly used is not that just described, but a simpler though less solid form invented by Gagneau. In Gagneau's lamp there are only two compartments in the oil reservoir. In each compartment there is a round opening of considerable size, covered partly by a membrane and partly by a round metal disk in the middle. Each of these metal disks is attached by a connecting-rod to one end of a lever which is made to oscillate by clock-work on its centre, and which at each oscillation forces one of the metal disks with the membrane attached a certain distance into one of the compartments, causing some of the oil in that compartment to ascend the tube by which the wick is supplied, and withdraws the other metal disk in a similar manner from the other compartment, which then receives a fresh supply of oil. Both of these lamps give a very bright and steady light, but they are both very expensive and liable to derangement, on which account they have very generally given place to the moderator lamp of M. Franchot, invented in 1837. In this also the oil is contained in a reservoir at the bottom of the lamp. The reservoir is cylindrical in shape, and in the interior there is a piston which is pushed down on the oil by a spiral spring, causing the oil to ascend in the tube in which the wick is inserted. This tube is of peculiar construction, and is that part of the apparatus which gives it its name, inasmuch as it is so made as to moderate or regulate the supply of oil. It is composed of two parts, the lower of which is of narrower bore than the higher, and slides up and down in it with the movement of the piston. A thin rod attached to the upper part passes a certain distance down the middle of this double tube, leaving considerable space around it in the upper and wider part of the tube, but very little in the lower and narrower part. The consequence of this is, that when the cylindrical vessel is full of oil, and when accordingly the piston is at the top, and the spring pushing it down is most powerful, the lower part of the tube is pushed up into the higher part as far as it will go, and the inside rod reaches nearly to the bottom, so that the progress of the oil upwards is very much impeded. As the piston descends, and the power of the spring diminishes, the lower part of the tube descends also, so that the inside rod does not reach down so far, and its impeding action is lessened. In this way the supply of oil is kept pretty nearly constant, as the resistance which the oil has to overcome in its passage up the tube increases and diminishes in the same ratio in which the power of the spring which forces it up increases and diminishes. When the vessel of oil is empty it is filled from the top, and the piston is then raised by means of a rack-and-pinion arrangement worked by a key at the neck of the lamp. There is a system of valves which allow the oil to pass into the lower part of the cylinder as the piston ascends. The excess of oil which is raised while the lamp is being used falls down into the cylinder above the piston, and finds its way underneath when the piston is raised. Since the invention of this lamp various modifications have been made in it by different constructors. The capacity of the cylinder and the strength of the spring have been increased so as to admit of the lamp being used for nine or ten hours continuously instead of four or five, and alterations have been made in the regulating part of it.

For petroleum, paraffin, and camphine or rectified spirits of turpentine, and other mineral oils, which have of late years come into very extensive use for illuminating purposes, a very simple kind of lamp is used. The oil-vessel is placed below the burner, which usually consists of a simple slit, down which a broad wick passes into the oil. The wick may be raised or depressed by a screw, and when the lamp is burning is kept a short distance below the opening of the slit. The oil is sucked up by the wick by the action of capillarity. A chimney, narrow at the bottom and the top, and bulging out at about the height of the flame, is fitted on to the lamp, and creates so powerful a draft that the flame is kept perfectly steady, and the gas proceeding from the heating of the oil is completely consumed. For an account of Sir Humphry Davy's safety-lamp see DAMPS. See also BLOWPIPE.

LAMP, ELECTRIC. See ELECTRIC LIGHT.

LAMPADIUS, WILLIAM AUGUSTUS, distinguished for his labours in chemistry and metallurgy, was born Aug. 6, 1772, at Hehlen, in the duchy of Brunswick, and early showed a decided inclination for natural science, but was unable from poverty to prosecute it till the support of Heyne, Gmelin, Blumenbach, and others enabled him to complete his acade-

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mical career at Göttingen. In 1793 he accompanied Count Joachim of Sternburg on a tour through Russia, and afterwards went with him to Radnitz, in Bohemia, where he employed himself much with chemistry and meteorology. At the special recommendation of Werner he was appointed, in 1794, extraordinary, and next year ordinary professor of chemistry to the Mining Academy of Freiberg. He began to lecture on metallurgy in 1796, and has the merit of having raised it to the rank of a technical science. He died at Freiberg, April 13, 1842. His principal work is a Handbook of Metallurgy, with supplements. His Elements of Metallurgy have been much used as a text-book. He also wrote numerous tracts on all the departments of technical chemistry, and more particularly has rendered special service by his treatises on the subjects of manure, fermentation, and gas-light. Most of his practical papers are in Erdmann's Journal für Praktische Chemie. By heating together pyrites and carbon Lampadius, in 1796, accidentally discovered bisulphide of carbon, but he made no investigation of it.

LAMPBLACK. See CARBON.

LAMPREY (*Petromyzon*), one of the two genera of fishes included in the order Marsipobranchii (Greek, *marsipos*, pouch; *bragchia*, gills), the other genus being the Myxine or Hag-fish. The lampreys are eel-like fishes, exhibiting a low degree of piscine organization; but they are essentially distinct from the eels, with which they are somewhat liable to be confounded. The elongated body bears none of the paired fins found in most other fishes, and which represent the limbs of other animals. It is destitute of scales, but is covered with a glutinous mucus. The skeleton exists in a very rudimentary state. The spine is represented throughout life by a *notochord*—the soft fibrous structure which represents the embryonic state of the vertebral column; and the separate joints of the spine are faintly indicated by the development, in the sheath of the notochord, of rings of osseous or bony matter. The upper part of the spine, which forms a canal for the passage of the spinal cord, is represented by cartilaginous arches, and the ribs are likewise mere gristly appendages of the rudimentary spine. The skull participates in the low degree of development exhibited by the spine. It is composed of cartilage, the distinct bones of which the skull in the higher fishes is composed not being recognizable. The lower jaw or mandible is undeveloped. The absence of the paired fins has been already noticed; a median fin (dorsal, caudal, and anal) runs round the upper and lower margins of the body at its hinder extremity, where it becomes somewhat compressed from side to side. The mouth exists in the form of a circular opening, bounded by a cartilaginous or gristly ring, upon which horny tubercles and teeth are borne; whilst internally the mouth and tongue are provided with numerous teeth. These teeth are disposed in circular rows, which in the sea-lamprey number twenty rows, four, five, or six teeth being situated in each row. The circular form of the mouth in the lampreys and hag-fishes suggested the term *Cyclostomata* ('circular-mouthed') applied to the order in which they are included in some systems of classification. And by aid of the mouth and the tongue, which acts like a piston, the animal is enabled to attach itself firmly, as by a powerful sucker, to fixed objects, and even when thus fixed to breathe by means of the peculiar arrangement of the gill-sacs, to which attention will be presently directed. Well-developed eyes are present in the lampreys, and an organ of hearing is also represented. The respiratory or breathing organs differ from the ordinary type of these structures in the majority of fishes, and from their peculiarity in conformation the gills have given the order to which the lamprey belongs its technical name. The outer aperture of the gills in ordinary fishes is covered by an *operculum* or 'gill-cover;' but in the lampreys seven apertures exist in a line on each side of the neck. These represent the gill-openings, and internally the gills are found to exist in the form of seven pouches, the internal surface of each sac or pouch being folded or plaited so as to afford a considerable surface over which the minute blood-vessels may be distributed with a view to the perfect purification of the blood. These pouch-like gills thus open externally by the seven apertures already described. Internally they open into a canal, which is situated below the gullet, and which in its turn opens in front into the mouth, so that ultimately the gill-sacs come to be in communication with the mouth. The entire breathing-apparatus is supported by an elastic framework of gristly material, the movements of which aid in the entrance or expulsion of water from the gill-sacs. Then, lastly, a 'spiracle' or opening exists on the upper aspect of the head, through which water may be admitted to the gills independently of their outer openings by a tube which leads from the spiracle to the mouth. The mode in which this curious breathing-apparatus acts will be readily understood. These forms, attaching themselves by their sucker-like mouths to fixed objects, are thus debarred from the inflow of water by the mouth for the purpose of breathing which takes place in other fishes. But through the outer apertures of the gill-sacs the water has free access to the gills, and can pass in and out independently of the inflow by the mouth, whilst the upper or 'spiracular' opening of the gill-sacs affords another means of entrance for the water, which can pass out by the outer openings in the neck. The lampreys appear to undergo a process of metamorphosis in the course of their development, the young form at first presenting little or no resemblance to the parent. Indeed the young lamprey was formerly considered to be an entirely different and distinct fish, and was described as such under the name of *Ammocœtes*. The lampreys mostly inhabit rivers, the common species being the River Lamprey or Lampern (*Petromyzon fluviatilis*, Pl. CV.–CVI. fig. 23), which is coloured black on its upper, and of a silvery hue on its under surface. It possesses only a single row of teeth. A smaller variety frequents some fresh-water streams. The Sea Lamprey (*P. marinus*) is a much larger fish than the River Lamprey. When fully grown it may measure 3 feet or even more in length, and may weigh over 6 lbs. The dorsal fins are detached and separated in this species; its colour being a dusky brown marbled with yellowish patches. The Sea Lamprey is common around the British coasts, especially the coasts of the more southern counties, and it is also found in the German Ocean and in the Mediterranean Sea. It ascends fresh-water rivers in the spring-time for the purpose of spawning, and at that season is taken in greatest abundance. Formerly the Lamprey was very much valued as an article of food and even of luxury. From the time of the Romans up to the middle ages these fish formed a notable article in the bill of fare of the great. In the present day the taste for lampreys has greatly declined, although in the markets of great cities, British and continental, they are still to be seen exposed for sale. The lamprey has a historical reputation, inasmuch as a surfeit of these fishes is alleged to have caused the death of Henry I. of England. In the Thames in former years lampreys were fished in large quantities, but this particular fishery has altogether declined, the chief sources of lamprey-supply being the eel-pots of deep-

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sea and river fishermen. There can be little doubt that the muræna of the Romans, often translated lamprey, was one of the true eels. To whatever species the particular fish of the Roman feasts may have belonged we know that it was held in the highest esteem. Thus we find Pliny telling us of the enormous sums of money and the great care which were spent on the cultivation of the muræna. The artificial fish-pond of Lucullus was thus said to have been sold for a sum nearly equal to £42,000; and one Hirrius is said to have furnished Cæsar with 6000 muræenas alone for a regal entertainment given to the people. We are also told that these fishes were kept as pets by both sexes of the Roman nobility. Several species of lampreys are said to occur on the American coasts, but it is doubtful if these are to be regarded as specifically distinct from the two typical forms already described.

LAMP-SHELLS, the familiar designation of the Brachiopodous Mollusca, the bivalve shells of which when closed bear a close resemblance to the shape of the old Roman or classical lamp. The Brachipods form a very limited group of living and existent organisms, although in past epochs of the world's history they assumed a high importance both in numbers and species. See MOLLUSCA.

LANARK, LANARKSHIRE, or CLYDESDALE, an inland county in Scotland, bounded on the north by the counties of Dumbarton and Stirling, east by Linlithgow, Edinburgh, and Peebles, south by Dumfries, and west by Ayr and Renfrew. Length, north-west to south-east, 52 miles; extreme breadth, north-east to south-west, 36 miles; area, 564,284 acres, of which considerably above a third is arable. It is divided into three principal districts or wards, called respectively the Upper or Southern Ward, the Middle Ward, and the Lower or Northern Ward, the last containing the city of Glasgow. The surface is various, in some places mountainous, especially in the extreme south, and in the south-eastern and south-western parts; in other places hilly, and in others again comparatively flat. The higher elevations occur in the Upper Ward, in the extreme southern portion of the county, where they reach from 2000 feet to 3000 feet above the sea. The principal range is called the Lowthers or Louthers. They are for the most part covered with heath or grass, which affords excellent pasture for sheep. The valleys or flat grounds which separate the hills are partly dry and partly wet and spongy. In this district is the mining village of Leadhills, so called from the lead that is obtained here, amounting to 1263 tons in 1881. The lead ore contains from 6 to 12 oz. of silver per ton. The Middle Ward is also rich in a mineralogical point of view, containing an abundance of whinstone, sandstone, ironstone, and coal. Coal and iron are by far the most important of the mineral products of the county. The ironstone (black-band) occurs both in masses and in seams, and is wrought to such an extent as to render the county one of the principle seats of the iron trade. In 1881 there were fourteen iron-works in the county, and eighty-eight blast-furnaces, of which seventy-seven were in blast. It is computed that the coal-fields comprise 55,000 acres, or about 86 square miles. The seams vary from 2 feet to 9 feet in thickness. In 1881 the 392 pits in operation produced about 12,000,000 tons of coal. In the Lower Ward immense fields of excellent fire-clay occur, varying from 4 feet to 19 feet in thickness. In their vicinity are extensive works for the manufacture of crucibles, &c. Through the whole range of the coal district both limestone and freestone abound. The principal river is the Clyde, which traverses the entire county from S.S.E. to N.N.W., and for the greater part of its course nearly through its centre. The contributory streams are the Douglas, Avon, and Calder, besides several others of minor importance. Throughout Lanarkshire the dairy system has been prosecuted with great success. The cows are mostly of the Ayrshire breed. In the Upper Ward between two-thirds and three-fourths of the surface are occupied by hill or moorland, incapable from the elevation of the county of much agricultural improvement. The Middle Ward exhibits great diversity of soil, but is generally of a clayey nature with greater or less intermixture of sand; in the valleys along the Clyde and other considerable streams a deep rich alluvial soil lies upon a bed of open gravel. A large proportion of this ward also is occupied with moss or peat earth. The soil and climate of this portion of the county are peculiarly favourable to the growth of wood; and spontaneous copsewoods everywhere adorn the hanging banks. Here also occur the beautiful and fruitful orchards for which Clydesdale has long been celebrated. The soil of the Lower Ward is on the south side generally clay, with some portions sand, comprising some rich alluvial tracts along the Clyde. On the north side numerous knolls or low round hills occur, the tops of which are in many instances hard and stiff, the bottoms wet and spongy. It also comprises a good deal of moist, moorish, and barren soil. In 1882 the total acreage under cultivation was 251,121 acres, of which 52,929 acres were under corn crops; 18,796 under green crops; 64,713 under clover and grasses in rotation; and 113,989 acres in permanent pasture, meadow, or grass not broken up in rotation. The chief corn crop was oats, which covered 46,905 acres, and the chief green crop turnips, which covered 9151 acres. In the same year the total number of horses returned as used solely for agriculture was 5666; the total number of cattle, 64,850; and of sheep, 210,322. The county is divided into the two parliamentary districts of North and South Lanarkshire, each of which returns one member to Parliament. The chief towns are Glasgow, Coatbridge, Airdrie, Hamilton, Rutherglen, Motherwell, Wishaw, and Lanark, the county town, which is smaller than any of the preceding. Pop. in 1871, 765,339; in 1881, 904,412.

LANARK, a royal and parliamentary burgh of Scotland, and the nominal capital of Lanarkshire, situated on elevated ground near the banks of the Clyde, 31 miles south-west from Edinburgh, and 25 south-east of Glasgow. It is supposed to be the Colania of Ptolemy, and is known to have been of considerable note at a very early period, Kenneth II. having held a parliament here in 978, In 1244 the town was destroyed by fire, and in 1297, the heroic Wallace first raised the standard of liberty here, slew the English governor, William Haselrig, and made himself master of the place. It was erected into a royal burgh by Alexander I., and its charters were finally confirmed by Charles I. in 1632. The chief employment of the inhabitants is weaving for the Glasgow manufacturers. Shoes are also made to a considerable extent, and there are several breweries. In the neighbourhood, higher up the Clyde, stand the cotton-mills and village of New Lanark, founded by David Dale in 1784, and the first locality in which Mr. Owen made a partial trial of his schemes for the social elevation of the working-classes. Not far from Lanark are the Falls of the Clyde, which render the town a favourite resort for tourists. It is a member of the Falkirk district of burghs for returning a member to Parliament. Pop. of parl. burgh, 4910; of royal burgh, 5874.

LANARKITE. This very rare mineral is found at Leadhills in Lanarkshire, Scotland, and in the Harz, Tyrol, and one or two other foreign localities. It is a compoud of sulphate and carbonate of lead

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($PbSO_4PbCO_3$), and it crystalizes in minute slender needles belonging to the monoclinic system, which, however, are usually aggregated. It has a greenish or yellowish colour, and is sometimes transparent; dissolves partially in acids, and is readily fused and reduced before the blow-pipe. Specific gravity 6·3 to 7.

LANCASHIRE, or the county palatine of Lancaster, a maritime county in the north of England, bounded on the north by Westmoreland, north-east and east by Yorkshire, south by Cheshire, and west by Cumberland and the Irish Sea; area, 1,208,154 acres, of which in 1882, 791,680 acres were in cultivation, chiefly under clover and grasses, oats, and potatoes, or in permanent pasture. The number of cattle in 1882 was 214,407; sheep, 266,561; pigs, 47,846; horses, 37,968. Its most northern part, consisting of the peninsulated hundred of Furness, is detached from the main body of the county by the intervention of part of Westmoreland and Morecambe Bay. Off the south-western extremity of this peninsula is the long narrow island of Walney, 10 miles long and less than 1 mile broad. The coast, stretching from the Mersey to the Duddon, is of great extent, and is deeply indented by bays and arms of the sea; the principal of which are Morecambe Bay and the estuary of the Ribble. The eastern part of the southern portion of the county, or south of the Ribble, is bounded by a range of hills separating it from Yorkshire, composed of mill-stone grit, the soil on which is generally thin and poor. The southern and western sides, extending along the Mersey, rest on the new red sandstone, while the coal measures occupy the whole central space. On the western side, next the sea, it presents great flats of sand resting on the western margin of a peat moss, under which is marine silt or blue clay, occupying an area south of the Ribble of 75 square miles. These mosses lying below high-water mark, and full of lakes or *meres*, were formerly thought incapable of cultivation, but by the aid of pumping machinery and extensive drainage works a considerable extent of surface has been reclaimed and is now in a tolerably high state of cultivation. Over these great flats sweep the cold vapours and tempestuous winds of the Irish Channel, unbroken by any mountainous ridge to intercept their severity. Lancashire north of the Ribble differs in many important respects from the southern division. With exception of a tract called the Fylde the county here is narrowed into a strip of a few miles in breadth, extending from the sea to the mountainous district which on the east divides it from Yorkshire. Red sandstone, millstone grit, mountain limestone, and clay-slate form the geological features of the district. Near the coast the land is managed chiefly in alternate husbandry; as it begins to rise towards the hills it is principally in grass, held by small dairy farmers; and the hills are stocked with black-faced sheep. The district called the Fylde embraces all that low alluvial district lying west of the Preston and Lancaster Railway (or a direct line drawn from Preston to Lancaster), and extending to the coast. The district of Furness, which forms the most northern part of the county, is an integral part of the mountains of Cumberland, the high land gradually subsiding as it approaches the coast on the south. The highest summits here are the 'Old Man,' in Coniston Fells, 2577 feet above sea-level, and another close by of the same height. The other principal elevations in the main parts of the county are Pendle Hill, 1803 feet; Bleasdale Moor, 1709 feet; Boulworth Hill, 1689 feet; and Rivington Moor, 1545 feet above sea-level. The peat-mosses or bogs of Lancashire form one of its most remarkable physical features. The most extensive of these is Chat Moss, 7 miles west of Manchester, about 5 miles long and 3 miles broad (see CHAT MOSS); White Moss, Rainford and Kirkby Moss, Halsal and Rufford Mosses. The most important mineral product of Lancashire is coal, which occurs abunbantly in the south and south-west, the field including nearly all the manufacturing districts of the county. Another exceedingly valuable product is the hæmatite iron-ore, which occurs abundantly in the Furness district, and the output of which has increased with extraordinary rapidity of late years. In 1880 the production was returned at 1,188,513 tons. It is to the utilization of these deposits of hæmatite that the thriving town of Barrow owes its sudden rise. Excellent freestone is quarried near Lancaster. Limestone occurs abundantly. In the north of Furness numerous quarries of blue slate are wrought. Copper occurs in Coniston Fells, and mines of this metal are profitably worked in the 'Old Man' Mountain, where the ore is found tolerably rich and in great abundance. Iron-stone, lead ore, coarse slate, flag-stones, and scythe-stones, brick-clay and pipe-clay are also found. The climate is temperate but in general extremely humid, especially on the west side. A great part of the county, especially east of the Lancaster and Preston Railway, is chiefly under grass, and let as dairy farms. The soil varies considerably, but with exception, perhaps, of the Fylde, which is comparatively rich, cannot be called naturally fertile. The principal crops are oats, wheat, barley, turnips, and especially potatoes, for the cultivation of which Lancashire was early noted. A large quantity of cheese, also, is made in the southern and western parts. In 1882 there were 560,387 acres of permanent pasture, 104,973 acres under corn crops (29,527 being wheat, and 60,508 oats), 66,743 acres under clover and grasses under rotation, and 56,149 under green crops. But Lancashire owes its celebrity, wealth, and population to its manufactures and commerce, and not to agriculture. It is the grand seat of the cotton manufacture, which has increased since 1770 with a rapidity altogether unparalleled in the history of industry, and caused an extraordinary increase of population and wealth. Manchester is the principal centre of the cotton manufactures, and Liverpool of the shipping trade of the county. The former, however, is carried on also to a great extent in the numerous other towns in the county. Woollen goods are also largely produced at Rochdale and Manchester, as are also silks, hats, paper, and a vast variety of other articles. By a return in 1879 the number of persons employed in cotton factories in the county of Lancaster was about 370,000, the number of persons employed in cotton factories in the whole of the United Kingdom being 482,903. There were also 50,000 employed in woollen and worsted factories, flax, hemp, jute, and silk mills. A complete network of railways, and several important canals, afford extensive means of rapid conveyance to all parts of the kingdom. In the later ages of the Roman Empire Lancashire was included in the province Maxima Cæsariensis, and afterwards formed part of the kingdoms of Northumbria and Deira. It suffered severely from the Danish invasions. It was made a county palatine by Edward III. for Henry, earl of Derby, in 1351. Lancashire comprises six hundreds, the cities of Manchester and Liverpool, and the municipal boroughs of Accrington, Ashton-under-Lyne, Bacup, Barrow-in-Furness, Blackburn, Blackpool, Bolton, Bootle-cum-Linacre, Burnley, Bury, Chorley, Clitheroe, Heywood, Lancaster, Oldham, Over Darwen, Preston, Rochdale, St. Helen's, Salford, Southport, Wigan, and parts of the boroughs of Stalybridge, Stockport, and Warrington, the remainder of which are in Cheshire. It is divided for parliamentary purposes into North Lancashire, returning 2 members,

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with the borough of Preston 2; North-eastern Lancashire 2, with Blackburn 2, Burnley 1, Clitheroe 1; South-eastern Lancashire 2, with Manchester 3, Bolton 2, Bury 1, Oldham 2, Rochdale 1, Salford 2, Ashton 1 (Stalybridge and Stockport chiefly in Chester); South-western Lancashire 2, with Liverpool 3, Wigan 2, Warrington 1. Lancashire is comprised in the dioceses of Manchester, Chester, Carlisle, and Ripon. Pop. in 1871, 2,819,495; in 1881, 3,454,441.

LANCASTER, a municipal borough and river-port, England, the county town of Lancashire, on the left bank of the Lune, over which there is an elegant stone bridge 549 feet in length, with five elliptical arches, 45 miles north by east of Liverpool. It is a station on the railway from Preston to Carlisle, and communicates by a direct line with Leeds. It occupies a gentle slope; most of the streets in the centre and business part of the town are narrow, but a few are tolerably spacious and well paved. On the summit of the hill, on the west side, are the castle, now used as the county jail, built in the reign of Edward III., but with a keep supposed to be Saxon, and with a tower on the south-east attributed to the Emperor Hadrian; and the church, a venerable and spacious structure in the later English style with a square tower. Nearly the whole town is built of freestone. The houses are generally substantial, and many of them handsome; of the latter class are some fine old mansions, once the residences of nobility. The public buildings comprise the town-hall, the custom-house, assembly-rooms, and a commodious building containing a music-hall, a mechanics' institute, the museum, &c., of the Natural History Society; Ripley's Hospital, the Royal Albert and the County Lunatic Asylums, &c. There is a free grammar-school, also various benevolent institutions. A public park was opened in 1881. The manufactures consist chiefly in the making of furniture, cordage, sail-cloth, and cotton goods; and there are floor-cloth, oil and varnish works, cocoa-nut fibre matting, railway rolling stock works, &c. The bulk of the shipping is now confined to the coasting trade, and vessels of large size unload at Glasson Dock, 5 miles below. Pop. in 1881, 20,663.

LANCASTER, a town of the United States, in Pennsylvania, capital of Pennsylvania county, 55 miles west of Philadelphia, on the Pennsylvania Central Railway. It consists of streets which cross at right angles, and are generally well paved, and of houses substantially built of brick, and when recent, often both commodious and elegant. The most imposing public buildings are the court-house, which is crowned by a dome; and the county prison, a large castellated edifice with a lofty tower. The other principal buildings are the churches, a college, and numerous schools. Next to cotton yarn and cotton cloth, for which there are three large factories, the chief manufactures are rifles, watches, machinery, tobacco, &c. There are several iron-foundries, and a blast-furnace. Lancaster is in the centre of a rich wheat district, and carries on an extensive lumber trade. Pop. in 1880, 25,769.——Another town of the United States, the capital of Fairfield county, Ohio, on the Hocking River, about 32 miles S.E. of Columbus, with which it is connected by rail. It is situated in a beautiful valley, and is a neat little town with wide streets, some of them lined with handsome buildings. It contains a court-house, city-hall, several churches and schools. There are iron-foundries, flouring-mills, and manufactures of machines and agricultural implements. Pop. in 1880, 6803.

LANCASTER, DUCHY OF, a duchy annexed to the English crown, having a separate equity court of its own, with revenues which go directly into the privy purse. The duchy is more extensive than the county palatine of Lancaster, having estates belonging to it in many other counties. The dukes of Lancaster had formerly royal power in the county palatine (see COUNTY PALATINE); they could pardon crimes, appoint judges and magistrates, and all writs ran in their name, offences being said to be committed against their peace, not against the king's. There is a chancellor of the duchy and of the county palatine, and a vice-chancellor of the county palatine; also a council of the duchy, an attorney-general, receiver-general, &c. The chancellorship is a political appointment, and the chancellor is generally a member of the cabinet. The court of chancery of the duchy takes cognizance of matters in equity belonging to the county palatine, as well as to those of the duchy. The crown derives a revenue from the duchy of over £30,000.

LANCASTER, JOSEPH, the propagator of the educational system which is coupled with his name and that of Dr. Andrew Bell, was born in London in 1771 or 1778. His father though in humble circumstances, gave him a good education, and in 1798 he opened a school in one of the poorest London districts. From feelings of philanthropy he endeavoured to make his school as little expensive as possible, in order that no children might be excluded from it, and is thus said to have been led to re-invent the educational system of mutual instruction frequently called the Madras system, which had previously been made known by Dr. Bell, and even practised long before his time in the East Indies. He soon found powerful support, and was able to erect a school-house, which in 1805 was attended by 1000 children. About the some time a school for 200 girls, founded by him, was taught by his sisters. The number of his patrons and the amount of subscriptions continuing to increase, he founded a normal school for training teachers in his system, which he now hoped to be able to extend over the whole kingdom. Lancaster was a Quaker, but received children of all denominations, and instructed them to read and understand the Bible without employing any particular creed. This led to his being powerfully opposed by the clergy, and the subscriptions fell so rapidly off that he found himself involved in debt. By the generosity of some friends, however, he obtained relief from his difficulties, made extensive tours through Great Britain and Ireland, and in 1811 had founded 95 schools, attended by 30,000 children. This success had been obtained in connection with a society which had been formed for the purpose; but Lancaster, imagining that the society hampered him, withdrew from it, and set up a separate establishment at Tooting, with the view of applying his method to the higher branches of education. It proved a complete failure, and reduced him to a state bordering on destitution. He then proceeded to America, where, in the newly erected Republic of Colombia, he found a zealous supporter in Bolivar, and erected a number of schools. The political circumstances of the country, however, deprived him of the fruits of his labours, and he subsequently went to Canada and the United States, into which his system had been introduced as early as 1806. He at first received some support, but ultimately fell into poverty. He died in New York in 1838.

LANCASTER GUN, a rifled cannon named after its inventor. Its peculiarity consists in having an elliptical bore, by which grooving is dispensed with. The ellipse of the bore is of a very slight eccentricity, and the projectiles are also made elliptical and of a similar eccentricity. This gun was introduced into the British army before the siege of Sebastopol, and a few were used there.

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LANCASTER SOUND, a passage leading from the north-west of Baffin's Bay west to Barrow's Strait, about lat. 74° N.; lon. 80° W. Its east extremities are formed by Cape Horsburgh on the north, and Cape Walter on the south; and its central breadth is about 65 miles.

LANCE, a weapon consisting of a long shaft, with a sharp point, much used before the invention of fire-arms, and still in use. It was common among the Greeks and Romans. The Macedonian phalanx was armed with it, and it was the chief weapon of the Roman infantry. The javelin, or *pilum*, was but secondary. The lance was the chief weapon in the middle ages, and was especially the arm of knighthood. The lance of the knight was of a peculiar form. Near the lower end it was very thick, with a deep hollow all round, in which the arm was placed when the lance was put in rest, preparatory to a charge. Immediately in front of the hollow the lance was from 1 to 1½ feet in diameter, and sloped off towards the upper end, which was from one-half to three-fourths of an inch in diameter. From this weapon the small bands, of which the cavalry of the middle ages consisted, took their name. A *lance* denoted a man-at-arms (horseman completely armed) with four or five attendants. Among the French in the fifteenth century these attendants consisted of three archers, one *coutillier* (so named from the long, broad dirk in his belt), and one page or valet. The introduction of fire-arms gradually led to the disuse of the lance in the West of Europe, though it continued among the Turks, Albanians, Tartars, Cossacks, Poles, and Russians, and other Slavonic tribes, among whom it was borne by light-armed cavalry, on fleet horses. Frederick the Great, seeing the advantageous use made of this weapon by the Poles, gave it to a portion of his cavalry, and afterwards formed an entire regiment of lancers. The Austrians followed, and soon established three regiments of *Uhlans*, as they were termed. After the partition of Poland, many Poles entered the French service, and a body of Polish lancers was established. The war with Russia, in which the efficiency of the lance in the hands of the Cossacks, particularly in 1812, was strikingly manifested, brought this weapon into still more repute, and the Prussians formed three regiments of Uhlans. The Uhlans are still a most useful body in the Prussian army. The French lancers were formed in 1813 to cope with the Cossacks. Almost all the armies of Europe now have regiments of lancers. There are five regiments of lancers in the British army. To use the lance with effect, however, requires much practice. The lances now in use among the European cavalry have a shaft of ash or beech wood 8, 12, or even 16 feet long, with a steel point 8 or 10 inches long, and to prevent this being hewn off the shaft is guarded by two strips of iron 1½ to 2 feet long, below which an iron ball is sometimes placed to prevent the lance point from penetrating too far. The other end has an iron cap, to prevent its splitting. The point has a small flag, intended by its waving to frighten the horses of the enemy. When not in use the lance is carried in a leathern shoe, by the right stirrup, dependent by a leathern thong on the right arm. In use it is carried under the right arm. This weapon requires a practised horseman. See PIKE.

LANCELET (*Amphioxus lanceolatus*), the solitary form included in the lowest order of fishes, that of the Pharyngobranchii (Greek *pharugx*, the pharynx; *bragchia*, gills), and which is also to be accounted the lowest of vertebrate forms. The lancelet is a delicate fish of small size, possessing a slender, transparent, lance-shaped body. This body is bounded on its upper surface by a median fin, which becomes lancet-shaped at the tail, and which is continued along part of the ventral or under surface also. It inhabits sandy coasts, at a moderate depth, in many parts of the world; and appears to be plentiful in the Mediterranean Sea. No true or paired fins are represented, and in the other parts of its anatomy the low organization of the creature is readily appreciable. Indeed it would seem to hover, as it were, on the very brink of *vertebrate* existence. The spine is thus represented by the notochord—a structure present in the early life of all vertebrates (see INVERTEBRATA), and which represents the embryonic state of the vertebral column. This notochord extends along the back, from end to end of the body, terminating at either extremity in a point. There is no appearance in this notochord of any of the bony elements of the true and perfect spine; and the only traces of further vertebral structure which are to be detected, consist of a series of gristly rod-like bodies which are situated above the spinal canal, and which may represent the spinous processes of the vertebræ, or which, as has been suggested, may be fin-rays. No skull or other hard parts belonging or analogous to the skeleton exist. In front, the place of the brain is occupied by the simple termination of the spinal cord; and from the front of the cord nervous filaments are given off to supply the parts of the mouth and the eyes, which are present in a rudimentary condition. The sense of smell is doubtfully represented by an olfactory organ situated in the middle of the front part of the head; and the sense of hearing is unrepresented by any structural element. The structure and surroundings of the mouth present features of importance in the consideration of the lancelet's anatomy. The mouth is of oval shape, situated below and slightly behind the front part of the body. It is surrounded by a ring of gristly matter, which supports small pieces of the same material; and these latter give origin to a number of delicate ciliated filaments or *cirri*, from the presence of which Owen's name of *Cirrostomi* ('cirrous-mouthed') has been applied to the lancelet order. The mouth leads backwards into a very large dilated chamber representing the expanded pharynx or back part of the mouth. This dilated chamber, from its structure, performs the functions of a breathing-organ, and from this circumstance the name of the order—Pharyngobranchii—has been derived. The walls or sides of the pharynx are perforated by transverse clefts or fissures, whilst the inner lining of the chamber is plentifully provided with vibratile filaments or *cilia*. The walls are further supported by a kind of cartilaginous framework; and the entire cavity is contained within a front extension of the abdomen, with which, through the clefts in its walls, it is thus in free communication. The possession of this curious breathing-pharynx has also suggested the name of *Branchiostoma* ('mouth-gilled'), sometimes given to the lancelet itself. Anteriorly to the pharyngeal sac a number of plate-like filaments richly supplied with blood-vessels is found, the function of these structures being supposed to be that of assisting in the breathing process. In this view, these free filaments may be regarded as corresponding to the free branchiæ or supplementary gills of other fishes. Breathing takes place by the admission of water through the mouth into the dilated pharynx, the effete water passing through the slits or clefts in the sides of the sac into the cavity of the abdomen, whence it escapes outwardly by an opening known as the 'abdominal pore.' The cilia, or vibratile filaments with which the inner lining of the breathing-sac is provided, keep up a continuous circulation of water-currents into the pharynx, and at the same time send on the effete water through the clefts into the abdominal cavity. No distinct

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heart exists in the lancelet, this fish, of all the Vertebrata, being the only form destitute of a distinct central organ of the circulation. The circulation of the blood is performed by contractile dilatations situated upon the main blood-vessels. The digestive system consists of a stomach and straight intestine, to which latter structure a sac-like organ representing the liver is attached. The name *Leptocardia* (Greek *leptos*, small; *cardia*, heart), given by Müller to the order of which the lancelet is the representative, has reference to the rudimentary condition of the heart in this form. The blood, moreover, is different from that of all other Vertebrata in that it is destitute of colour. In its development, the lancelet shows many points of affinity to the Invertebrate groups; and this form has been pressed into the service of recent theories regarding the origin of living beings, as tending to illustrate how the higher and Vertebrate groups of animals may have become developed from lower and Invertebrate forms. The chief points in which the lancelet differs from all other and known Vertebrata consist in the want of a defined skull and distinct brain; in the absence of a distinct heart, of kidneys, and of an organ of hearing; in the possession of the peculiar ciliated branchial or breathing sac, and of a ciliated digestive tract or canal; in the peculiar form of the liver, which exists as a sac-like appendage to the intestine; and lastly, in the notochord or embryonic spine being extended forwards to the front portion of the body. (Pl. CV.–CVI. fig. 25.)

LANCELOT OF THE LAKE, the name of one of the paladins celebrated in the traditions and fables relating to King Arthur or the Round Table. According to tradition Lancelot was the son of Ban, king of Brucic, and after his father's death was educated by the fairy Viviana (the Lady of the Lake). The youth having given proofs of great valour she took him to Camelot, to the court of King Arthur, and requested him to make him one of his knights, and to admit him to the number of the heroes of the Round Table. Arthur with his sword (*escalibor*) dubbed him knight, and Lancelot subsequently distinguished himself by his extraordinary deeds and great heroism amongst all the paladins of the Round Table. His love for Genevra, or Guinevere, the beautiful wife of Arthur, and his disregard of Morgana, a fairy, and the sister of Arthur, placed the knight in the most dangerous and marvellous situations, from which, however, he always extricated himself by his valour and the assistance of the Lady of the Lake. He finally succeeded to the throne of his ancestors, after having defeated King Claudas, the murderer of his father, but was slain by Mordred, the nephew and murderer of Arthur, whom Lancelot wished to punish. In his last moments Viviana appeared to him, and with a gentle kiss took the last breath from the lips of the dying hero, who was the sole survivor of the knights of the Round Table. His remains were taken to his castle, and there deposited near those of the beautiful Genevra.

LANCEROTA. See LANZAROTE.

LANCERS. See LANCE.

LANCET WINDOW, a window frequently occurring in the early pointed Gothic style, and often in groups of several. It was a narrow window with an acutely arched top.

LANCEWOOD, the wood of the *Guatteria virgata*, a tree inhabiting Jamaica. It is of moderate size, but is one of the most useful and valuable trees of the island. The wood possesses in a high degree the qualities of toughness and elasticity, and is on this account extremely well adapted for the shafts of light carriages, and all those uses where light, strong, but elastic timber is required. Ash of the very best quality is found to be inferior to this wood both in strength and elasticity.

LANCIANA, a town of Southern Italy, in the province of Abruzzo-Citeriore, 13 miles south-east of Chieti. It is the see of an archbishop, and has a cathedral and several other churches. Its trade, once considerable, has greatly decayed. Pop. 9728.

LAND, PROPERTY IN (political economy), questions connected with the theory of property in land form at all times one of the most important subjects of investigation in political economy. At the present time they have acquired an added, though perhaps somewhat adventitious, interest from the speculations of economists of an advanced school. Such speculations always tend, especially when supported by names of weight, to affect, through public opinion, the legislative constitution of society. It is strongly held, by some economists of great reputation, that the question of property in land is intimately connected with the most vital economical problem of the day, that of the position of the industrial classes, and the remuneration of labour. It is held that a wider distribution of land would materially affect the condition of the classes dependent on labour; that it is, in fact, the only solution of certain difficulties in their position, and that the existing distribution of property is a monopoly brought about by means inconsistent with the mutual obligations of society, and which it is expedient and necessary to revise with a view to its gradual but complete alteration. If we seek from history a solution of the theory of property in land, we will find, in the first instance, only a chaos of facts, in which almost every kind and variety of tenure will be found represented in some way, and without any fixed and invariable order of succession. It is the prerogative of political economy, as a science equally related to fact and speculation, to unravel this confusion, to write history hypothetically, not as it has actually happened, but as it may be supposed it might have happened, with the elimination of accidents foreign to the immediate object of speculation. This prerogative is always liable to abuse, and in no subject has it been more abused than in regard to property in land; but no amount of abuse can dispense with the legitimate exercise of speculation, and all that can be required of those who are compelled to follow the advocates of doubtful speculative dogmas, is to conduct their speculations with greater circumspection. To deduce from history the fundamental doctrines involved in the appropriation of natural agents is not, after all, a matter of insuperable difficulty, if only we can avoid coming to the subject with rooted prejudices and unalterable prepossessions. The existing position of the question is this. The actual tenure of property in this country recognizes the right of individual ownership in a manner much more absolute and exclusive than a large and increasing class of economists believes to be right or expedient. Among the opponents of existing rights, if so strong a term can be applied to some of the more cautious advocates of innovation, there are all diversities of shades of opinion, but one leading dogma may be said to characterize all who seriously object to the existing disposition of property, namely, that the right of property in land belongs by an inherent and inalienable title to the society and not to the individual. In its extreme form this principle amounts in regard to the tenure of land to communism. When it is held along with the expediency of permitting individual property in land it is of the greatest possible elasticity, and admits of any modification of tenure which it may be the will of society to impose or the pleasure of the speculator to suggest. There is, of course, one drawback to this

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elasticity of tenure. It is liable to awaken doubt and uncertainty in the mind of the holders of land, and to diminish the advantages, if any, of proprietorship. The actual tenure of land does not afford any decisive dictum in favour of either of the rival theories which it is incumbent on us to examine. If the society is represented by the sovereign the theory of British, and especially of English law, is that all land is held of the sovereign (see the following article), but in practice this theory has long been little more than a dead letter. The abolition of feudal tenures in the reign of Charles II. is a proof that it was already virtually extinct, and it cannot be said to have since acquired any fresh vitality. The impotence of the crown to infringe on the territorial rights of the subject is in Scotland equally, if not even more decided. None would, in fact, be more opposed to the revival of any mere kingly prerogatives than the advocates of territorial reform; but in the fiction of sovereign authority they find the true *dominium directum* of social right. When we are asked, however, to assume this as a historical interpretation of the fact, we do not find it in the origin of our own laws. The feudal law of Europe, in which our own territorial rights originated, had for its fundamental principle the right of conquest; and if we examine the land tenures of Asia we shall find that they have mostly, if not altogether, sprung from the same source. Authentic history, in fact, does not lead us back far enough to enable us to discover the origin of property, and in as far as it is important to our subject, we must be indebted for our views of it chiefly to speculation. Thus much we may know, that even among nomadic peoples there is a distinct perception and recognition of the fundamental principle of property in relation to land. The hunting grounds or pastures which are alternately occupied by these migratory tribes, are held by them as appropriated to their use; and disputes and wars arise when, during their temporary abandonment, they are occupied by others. Thus, even the most roving tribes among the nomadic races of Asia, Europe, and America, have always had their wanderings circumscribed by the claims of other nations of similar habits, whence wars have originated among them just as from territorial disputes among more settled nations. It may, perhaps, on the whole, be allowed that the idea of property among communities in this stage of civilization is collective rather than individual, although no certain conclusion can be drawn from a comparison of facts, and theorists might find abundant support from history for the most opposite conclusions, all manner of constitutions being found among these as well as among more advanced communities. In the Highlands of Scotland, for example, in a state of society not very remote from the nomadic, property was inherited by primogeniture, and the laws by which it was distributed were in the closest resemblance to feudalism, which may itself be considered as a transition from the nomadic to the settled state. If from the uncertain light of history we turn to the principles of justice and expediency, the claims advanced for various tenures of property are both numerous and complicated. On the ground of abstract justice it is asserted that all men have an equal right to the soil. This right might be questioned on various grounds, but what effectually disposes of it in its naked form is its utter impracticability. It would be difficult to establish the right even of a community to the territory on which it is settled if the territorial rights of each individual of the human race were insisted on; but taking the community, and supposing it to have a settled disposition of property on any conceivable basis, how are the rights of the new members, added to it by birth or immigration, to be adjusted? It but disguises these difficulties to vest the inalienable right in the community and not in the individual. Obviously all individuals cannot be treated alike, and whether the monopolist be an individual or a collective one, the effects of the monopoly will be equally disadvantageous to those who are excluded from it. M. De Lavellaye, a recent advocate of this principle, has shown that it still exists in some of the Swiss communes with precisely this effect—families not included in the original distribution being more effectually excluded from the possession of property than in countries where the land is held by individual tenure, and consequently transferable by sale. Such considerations have compelled all sober speculators to admit the expediency of at least a modified individual tenure of property; but it is still held that this tenure exists only for the convenience of the community at large, and may be withdrawn when it fails to answer, much more when it thwarts the end for which it was granted. A distinction is generally drawn by those who take up this position between property in land and other species of property, and this distinction is frequently founded on a theory of the origin of proprietary rights, which is supposed to afford a solution of the difficulties of this question, and to place these rights on a basis of natural justice. John Stuart Mill, though not the originator, was one of the most able and cautious exponents of this theory. No man, it is assumed, has a right to appropriate natural agents to his exclusive use; but the modification of these agents by labour gives a valid claim to their possession. Thus labour is held to be the true foundation of property, and while the soil, the common store-house of natural agents, is held to be an inalienable common possession, an absolute right of property is supposed to be established in products taken from the soil by labour, and even a modified right is created in the soil itself by labour bestowed on its improvement. Even if this theory could be held good it would only substitute for the previously existing difficulties the equally formidable difficulty of distinguishing between natural and acquired rights; but the distinction on which the entire theory is founded is wholly illusory. If the soil is in any sense common and inalienable property, those who take anything from it take from it what belongs to all. Their labour can give them no possible claim to appropriate what is thus abstracted from the common store, for the value of labour depends entirely upon the possession of appropriate agents on which to exercise it; and there are many others who with equal right would have been glad to have bestowed similar appropriating labour upon the natural agents which have been monopolized by their appropriation. He who appropriates money or other portable property abstracted from the soil, moreover, appropriates to his own use the means of procuring subsistence just as much as he who appropriates the soil itself. Labour without natural agents cannot possibly afford a foundation for property, and as the appropriation of natural agents has commonly labour for its end, it is no solution of the question to say that labour justifies appropriation. The only source to which the appropriation of property can be referred is the universal instinct of appropriation in the human mind. The fact of appropriation needs no justification. Man finds natural agents suited to his purposes. He finds no rivals but his own fellows capable of disputing them with him, and no difficulty arises until disputes arise among men about their respective appropriations. Even then it may be observed that there is a natural principle of justice which inclines men mutually to respect each other's appropriations;

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and it is only when these press severely on those affected by them, as when all the available means of procuring subsistence are already appropriated, that serious questions arise. Whether the original appropriations were individual or collective seems a matter of no consequence. Probably, as the original constitution of society is the naturally formed union of the family, the first appropriations may have been so far collective as to have been made on behalf of family groups; but as the father is the natural head of the family, they may have been so far individual as to be under his control. When cultivation began, and combination became indispensable, a new motive would be supplied for collective appropriation; but as all industrial combinations must be directed by a head, an individual director, and, finally, a proprietor, would naturally spring from such collective appropriations. It is not, then, to the origin alone, but to the issue of social combinations, that we must look for the distinctive principle of property. They who seek it exclusively at the source read history backwards, and miss its true purport. Now whatever uncertainty may surround the original forms of appropriation, all history attests a uniform course of development in its issue, and the end to which it invariably gravitates is exclusive individual possession. When the feudal system was superimposed on a simpler form of tenure the insecurity of possession in which it originated gave the division of proprietary rights so wide an acceptance as to afford it the fairest chance of permanence. The feudal system was admirably welded, and its spread over the greater part of Europe, together with its independent administration in innumerable manorial estates, made its progress equivalent to a large series of independent experiments. The result in every case was the same. As soon as security returned the individual rights of each proprietor became extinguished or defined. Whether we watch the history of a manor or of a kingdom, the result is the same. When the superior, from his personal vigilance or the limited extent of his domain, proved stronger than his vassals, he became an absolute proprietor; when from the extent of his nominal rights he was unable to enforce them, they were gradually wrested from him, leaving only empty forms, which, when they proved irksome, were gradually discontinued. When the forces were more equally balanced, services were commuted into rents, and a fixed proprietary determined on one side or the other. In all these changes, however diversified in appearance, one universal principle is to be discovered, that the individual interest constantly represented by possession, in the end proves stronger than all mere customary or abstract rights. Possession, of course, must be understood not in the literal sense of material possession, but of the active exercise of possessorial rights. A landlord may, on proper terms, depute the actual possession of a territory to a tenant without suffering any detriment of his rights; but if his rights are left either unexercised or ill-defined, the abandonment of possession cannot be made without serious risk. Whether we turn to ancient or modern history, we shall find the same constant tendency to a fixed determination of property. In India, as in feudal Europe, the theory of the Mohammedan conquerors was that the territory belonged to the crown. It was farmed out to collectors, whose incessant efforts to become proprietors have, during the decline of that empire, and still more under British rule, been crowned with success. We thus find that in all states of society the desire of appropriation is a perennial source from which the claims of proprietary right incessantly spring. This natural impulse is sufficient to account for all the proprietary rights existing in the world, and, in point of fact, it does account for all whose origin can be traced. Of necessity all original appropriations of land must have been mere arbitrary appropriations of unclaimed possessions, but when the actual proprietorship of any territory can be traced to its source, it is not found to have descended in an unbroken line from the first appropriator. It always begins with a 'conquest,' in which the weakness or negligence of a previous proprietor has been taken advantage of. One thing which this origin of property renders clear, is that proprietary rights are not derived from the state. The authority of Kant is quoted for the *dictum* that all true proprietary rights originate in the state; but if Kant has so expressed himself, it is only one of innumerable proofs that the clearest intellect does not guard a man against error in matters which only come casually and incidentally before him. Had Kant investigated the matter in all its bearings it would have been impossible for him to have expressed such an opinion. The state does not give the instinct of appropriation, nor can it take it away. Whatever power the state may have to regulate the disposition of property, all history proves that, so far is it from being able to prevent its being acquired otherwise than by its own disposition, that most important accumulations have constantly been effected against its active resistance. The confusion which exists in many minds in regard to the relation of the state to property arises from a want of due care in separating fact from theory. The legal fictions or theoretical claims of the state over property are supposed to represent the abstract right of society, but in point of fact they originate in a very different way. They are, as already pointed out, relics of the right of conquest. The functions of government, like the rights of property, have been much more frequently usurped than legitimately derived, and the actual proprietary claims of government are to be explained not on any abstract principle, but from the simple fact that governments being human, and, moreover, frequently representing individual interests, have, like individuals, had and exercised the instinct of appropriation. But although the right of holding property does not originate with government there is another way in which it comes legitimately within the control of government. It can only be permanently retained and profitably exercised through the protection which government affords. Proprietary rights then require the sanction of government, and if government, as the general representative of society, is asked to protect these rights, it may reasonably make conditions with the holders as to the terms on which it shall do so. In making conditions for the protection of property, that is to say, in framing proprietary laws, government ought certainly to be guided by principles of abstract justice; but from what has been already pointed out it is evident that not justice alone but expediency must have careful consideration in the formation of these laws. The question, What ought a government to do? is certainly a right one; but the question, What can it do? is not the less a necessary one. If a government, from a theory of abstract right, tries to set aside the principle of appropriation, it will as surely find that principle too strong for it as those governments have done which have attempted to overrule it from mere interested motives. There are two things then which it is clearly not expedient for a government to do. It ought not to attempt to trace up existing rights until it finds a pure title, because it is impossible for it to do so. It ought not to attempt to redistribute property on any abstract principle of justice, because that is equally impossible. But because the security of property and the facility of lawfully acquiring it are necessary to the peace and highly advantageous

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to the prosperity of society, and the continuance of violence and fraud highly disadvantageous to both, it ought to take means to render property secure and easily transferable. It has already been noticed that, along with the desire of appropriation, there exists among men a counterbalancing disposition to respect the appropriations of others when these do not interfere too violently with their own convenience. This disposition is evidently a just counterpoise to the other, and as it perfectly accords with the whole interests of society, it is by strengthening it into a principle and rendering it inviolable that a foundation is laid for the security of property. In establishing this principle a government must implicitly recognize the principle of appropriation, whether founded on priority of possession or any other title. It can only go back a very little way in correcting previous frauds or violence, and must at some point recognize a prescriptive title, to question which would cause greater injustice than it would remove. It may indeed formally reserve to itself the right of future appropriation, but if it has any extent of vacant territory it must be prepared to part with it on easy terms to actual occupants, or it will find its formal title unavailing against the claim of possession. Such are the leading principles on which the proprietary laws of the most settled and best governed states are founded. Where they are disregarded, whether from the weakness or the rapacity of the government, anarchy and confusion, or oppression and insecurity prevail, to the destruction of systematic industry and the impoverishment of the community. Priority of appropriation is thus the highest source to which the right of property can be traced. This would give indeed but a feeble title without effective occupation; but when it was disputed, there being no higher principle to appeal to, force would necessarily decide between the disputants. When occupants were few disputes would rarely arise, because the society and co-operation of a neighbour would be more valued than an empty title; but as soon as the increase of numbers gave a proprietary title, whether held individually or collectively, an intrinsic value, the impracticability of maintaining the theoretical principle of equal rights, would, whatever might be the fiction of the law, make actual possession, that is, priority at the time of settlement, whether derived through conquest or succession, the only real basis on which property could be settled. That the actual disposition of property in this country should have given rise to theories adverse to this view of the fundamental law of property demands some notice of the grounds on which this disposition of property is objected to. Even if the evils complained of are real some caution is requisite in dealing with them, for nothing is more common than that real evils should give rise to the suggestion of false remedies. In general the object of all proposed modifications of the tenure of property is to secure a much freer subdivision of it. It is clearly seen that there are some things in our proprietary laws not essential to the fundamental principle of individual as opposed to common proprietary which hinder the division of property; but it is also perceived by many that the working of the individual principle, taken alone, would never result in the extent of subdivision they wish to attain, hence they propose to control and modify it by some principle defined or undefined founded on common right. Of the various advocates of common rights, or rather of the claims of those who are excluded from holding property, some touch the fundamental principles of proprietary right much more closely than others; some indeed seem almost to respect it altogether; but as all of the class of writers to whom we refer, who are received as authorities in this country, seem to agree on two points, they can hardly be classified apart. The two points of agreement are, that they regard the subdivision of property as superior to any theory of tenure, and that they all profess to regard some form of compensation as necessary to the commutation of existing rights. It is true that where commutation is dictated by one party to another compensation must be to a great extent illusory; but this view shows at all events that these writers have no love of spoliation, and that it is their misfortune and not their fault if they are compelled to regard existing tenures as in any respect invalid. To restore to the people an interest in the soil, to establish peasant properties, is the great object of the suggestions, whether practical or theoretical, of the school of economists we are considering. In this project these writers find a charm which seems at once to dissolve all those difficulties in the position of the industrial classes to which they are otherwise painfully alive. There are two difficulties, however, in regard to this resolution of the industrial question to which the attention of these economists does not seem to have been turned. Admitting that cultivation under peasant properties is more productive than under larger tenures, and that this tenure tends to check the growth of population among the proprietors, which is all that its most thorough advocates can ask for it, unless we are to abandon combination in labour and return to a more primitive civilization in which the agriculturist supplies his own collateral wants, the non-agricultural population will bear about as large a proportion to the agricultural under the new arrangement as under the old. To it the check on population will not apply, and all the questions connected with the remuneration of labour will remain open, aggravated probably by a denser population and a severer strain upon the productive capabilities of the soil. But assuming even a return to the earlier civilization, and that the whole paradise pictured by our economists should be realized, what is to be the guarantee for its permanence? Either society in redistributing property must retain the right of future redistribution—and then the stimulus to exertion and to abstinence from over-increase of numbers will be gone; or it must give absolute right of property, and then the differences of individual capacity and other accidents will rapidly lead to inequality of distribution. It is very remarkable that with the economists whose views we are considering, particularly with Mr. Mill and his followers, the evils of an arbitrary tenure of property seem to disappear as soon as the property is sufficiently subdivided. They, in fact, insist with great enthusiasm, as if it were a new discovery, on the superiority of the labour which a man bestows for his own behoof over hired labour, and in apparent oblivion of their own theories insist that it is the 'magic of property' which produces the results they so much admire. This is, in fact, the turning point of the whole question. It is by no means settled whether large or small properties are on the whole the most productive. It is perfectly clear that in the case of a given amount of labour, combination, which can only be exercised to the full extent on properties of considerable size, has an immense advantage. The advocates of peasant properties seem, however, to have made out that through an abnormal development of avarice the holders of these properties are induced to bestow on them an excessive amount of individual toil and care, which renders the comparison of total results doubtful. Whether in a social point of view this is a state of things which it is desirable to generalize is perhaps doubtful, but it is not a little remarkable to find those who object to an absolute alienation of what they hold to be a common right insist so strongly on the individual desire of

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accumulation when prompted by the hopes inspired by ownership over real property as the spring of the prosperity to be expected from their own arrangements. It is no new doctrine to economists whose communistic sympathies have not led them to look another way that the desire of accumulation is the mainspring of industry. It is this which reconciles economists to any original disposition of property which gives security to industry, seeing that whatever the primary distribution of property may be, there is in a state of liberty a constant gravitation to a distribution regulated by industry alone; and it is a confirmation of this view to find that the principle of individual tenure of property cannot be attacked on the ground of economy without invoking it in a new form.[1] But what these economists entirely overlook is that the object of all the toil they so commend is to defeat their own end and secure that very accumulation of territorial wealth which it is their design to frustrate. It is a mere inadvertency of thinking to suppose that the motive to accumulation can thus be doubled, or made to work in two places or at two times for one set of results. Men cannot like bees be robbed of their honey and set to work again. The advantage to the industrial classes of redistributing bloated capitals would be quite as great as that of breaking down large properties, if either could be done periodically without disturbing the sense of security and breaking the spring of industry. But without disturbing the tenure of property, there are various laws regulating its transference and succession by the amendment of which its divisibility might be promoted. With regard to the mere simplification of the transference of property, and of all contracts in regard to its occupancy, there can be but one opinion among economists as to the great value and importance of every reform tending in this direction, and there is here yet much room for reform. The laws of succession involve questions of greater difficulty. By merely abolishing primogeniture, and rendering the division of property among descendants or collateral heirs of equal degree obligatory, the principle of accumulation might be overmatched and a division minute enough to satisfy even the advocates of peasant properties secured. This is accordingly what is advocated by Professor Fawcett, but only in the case of properties of which the owners die intestate. Professor Fawcett vehemently contends that primogeniture is unnatural, but this is precisely the doubtful point, and as he does not seem to think that his assertion will be questioned he offers no proof of it. If by what is natural we are to understand what happens when men are not guided by preconceived theories we should be disposed to come to the opposite conclusion. History, it is true, offers examples not only of both kinds of inheritance, but of almost every other conceivable kind of it; but the balance of evidence, we think, is in favour of primogeniture. If again we are to understand by natural what is promotive of the greatest advantage, we are still unable to agree with Professor Fawcett. We believe that both in a social and a political point of view the maintenance of a body of considerable landed proprietors is of indispensable utility to the state. Without such a body the leisure and means necessary for the maintenance of a class to represent the higher education of the country and many other important social organizations would have to be supplied entirely by the fluctuating population of the towns. Politically the value of primogeniture is still more conspicuous. It was to a great extent the non-adoption of this principle that so weakened Germany as for several successive ages to make France the leading power of Europe. France, since her great revolution, has abandoned the principle of primogeniture and adopted an enforced division of property among descendants. To the want from this cause of a governing class of large proprietors, and the abandonment of the control of government to the *doctrinaires* of town populations, may probably in great part be attributed her failure after so many revolutions to reach a position of security and repose. It seems, moreover, an undue stretching of the functions of government to make an intestacy law run contrary to instead of in conformity with the general custom of the country; but as the tendency to accumulation of real property in this country is from various causes excessive, a modification of Professor Fawcett's proposal to the effect of reserving a certain proportion of intestate property as an appanage for younger children would probably be beneficial both in its own operation and in its effect on the habits of testators. Entail is merely an exaggerated form of primogeniture, and its existence is a strong proof of the natural force of that principle. It is not always in the power of a government, as has already been shown, to overrule such expressions of individual interest. But although in regard to the direct desire of accumulation the interest of the individual is stronger than any supposed interest of the community of an adverse kind, this cannot be held to be the case in regard to so artificial a development of the desire to found a family as entail. In this matter the power and the vigilance of the community may fairly be held equal to the strongest individual tendencies, so that any disposition of the law of entail that may be considered advantageous to the community may be held to be fairly within the competency of government to enforce; but as the detailed consideration of this question trenches on the limits of our subject we shall not pursue it to any practical conclusion.

Finally, we may lay down the following positions:—That on social and political grounds it is not desirable that property should be entirely subdivided into small holdings for peasant cultivation; that without a forced abolition of primogeniture and compulsory enforcement of divided succession it would be impossible to maintain such a division; that a

[1] Mr. Mill appears to think that with laws which did not unduly favour accumulation the distribution of property would be much more equal than it is. This can hardly be the opinion of any one who observes on the one hand how rapidly property is accumulated by successful industry, and on the other how numerous under the freest development of industry are those whom competition impoverishes, unless he holds Mr. Mill's peculiar doctrine that the right of transmission to heirs is not an essential part of the principle of private property. Mr. Mill overlooks, in thus judging, the most important circumstance of the whole case, the complete change in the motives to industry which would inevitably ensue from the withdrawal or restriction of the right of succession. We can from past experience form no conception of an organization of industry from which the right of succession was withdrawn; nor is it necessary that we should attempt to form any conception of it, for so far from such a condition being possible under a free organization of industry, all the force of the most despotic government would be insufficient to maintain it. Mr. Mill, it is true, would probably only have desired to modify the right of succession; but on this it is only necessary to observe, first, that it is impossible to take away any part of this right without taking away a corresponding part of the motive to industry, and secondly, that this restriction could only be maintained by the external force of government, and would be a violation of that free development of industry on the principle of private property for which Mr. Mill contends. Mr. Mill also attaches undue importance to the original distribution of property. This is a natural consequence of the view which he adopts of the relations of capital to labour, a view which we hold to be entirely erroneous, but which it would be beyond the scope of the present article to discuss. See Mill's Political Economy, book ii. chapter 1.

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partial introduction of peasant cultivation along with larger properties would constitute a merely sentimental innovation which would in no way affect the general condition of the industrial classes; that even the complete establishment of peasant properties would not necessarily increase the proportion of the agricultural to the non-agricultural class, or in any way improve the condition of the latter. We conclude then that those economists who propose the introduction of peasant properties as in any respect a solution of the difficulties which arise between capitalists and labourers are, by their advocacy of an irrelevant issue, committing a double evil, in exciting anticipations which cannot be realized, and in diverting attention from the true problem, the constant tendency of population to press on the means of subsistence, which no disposition of property can affect; and that the security of property is the mainspring of industry, and that security is one and indivisible.

LAND, TENURE OF. The existing system of land tenure in England originated in feudalism. In the early times of feudalism in Europe two original modes of holding property were chiefly prevalent among the Celtic and Teutonic nations: the *allodial* tenure (from *los*, lot), a free tenure resulting from the distribution of lands by lot, and which gave entire possession, together with the right of hereditary transmission; and the *feudal* (from *feo*, wages, and *od*, possession), over which the holder had but a conditional dominion, subject to the will of a superior. During the protracted period of lawlessness, confusion, and violence resulting from the enfeeblement of authority occasioned by the fall of the Roman Empire, and gradually terminated by the slow formation of the principal European states, the feudal tenure constantly gained ground on the allodial; first because it was essentially a tenure by conquest, and secondly, because its peculiar and complicated constitution, devised in and specially adapted to troublous times, gave greater security to the actual holder of the soil than a more independent tenure. When the northern adventurers, who were constantly seeking new settlements, organized themselves under military leaders, the allotment of land among them did not take place by lot as under more democratic constitutions. The chief who exercised the supreme authority distributed the conquered territory among his immediate followers, and they again among their dependants, on the condition of future as well in consideration of past services. The allodial proprietors, in the meantime exposed to every species of insecurity, were glad to compound with some neighbouring chief for protection in return for service. By degrees the feudal chiefs grew into powerful sovereigns, and the sovereigns of states already settled were compelled to adopt the feudal customs as the means of maintaining their authority. While the smaller allodial holders sought the protection of the territorial magnates the sovereigns persuaded or compelled these magnates to own allegiance and fealty to them. Thus a sort of hierarchy of territorial possession, extending from the sovereign to the serf who cultivated the soil, and united throughout all its grades by the mutual bond of protection on the one hand and of service on the other, was established over the greater part of Europe. From the nature of this bond the only service esteemed free and honourable was military service, and labour was degraded to a menial occupation. The earlier allodial tenure was not, however, altogether extinguished by the prevalence of the feudal system. Some remains of it are still to be found in various parts of Europe, as well as in Scotland. Some beginnings of feudal law were introduced into England during the period of the Saxons and Danes, and on the Norman Conquest it entirely superseded allodial tenure, and so overlaid the customs peculiar to the Saxons and Danes that their continued existence became subject to the interpretations imposed by it. It thus became the maxim of English law that the *dominium directum* of all the land in England was placed mediately or immediately in the crown, and separated from the *dominium utile* or possessory title, which conferred the right to the use and profits of the soil, and which is designated by the term *seizin*. The details of English land tenure are derived chiefly from the primeval customs and codes of the German tribes, together with some customs of Danish origin, the *capitularia* of the Merovingian and Carlovingian kings, and the feudal customs of Normandy. The Norman Conquest was complete, and the rights or usages of conquest were enforced to their full extent. Most of the large holders of land were dispossessed, and the smaller holders reduced to vassalage or serfdom; but it was not till near the close of the reign of William I. that this enforcement of the Conquest was effected. The ecclesiastical tenures of the Saxon period were not abolished by the conquest, and these still remain in force. All lands in England are thus held to have been originally granted by the sovereign, and were formerly at least supposed to be held of him mediately or immediately, in consideration of certain services to be rendered by the holder. Those who held immediately from the king, the most honourable tenure, were called tenants *in capite*. This tenure was of two kinds, *ut de honore*, where the land was held from the king as proprietor of a particular manor; and *ut de corond*, where it was held from him in right of the crown. Those who held from the tenants *de capite* were called *mesne* (middle) lords or barons, while the lower tenants, as those who made the land available for profitable purposes, were called tenants *paravail*. The lands were divided into feuds proper, or purely military, and improper, or those sold, bartered, or given for any other consideration than military service. Lay tenements were divided into two great classes, *freehold* or *frank-tenement*, and *villenage*. (See FREEHOLD, FEE, and VILLENAGE.) Frank-tenements were again divided into *knight-service* and *free-socage*. Knight-service was divided into knight-service proper, grand-sergeantry, and cornage. (See GRAND-SERGEANTRY and KNIGHT-SERVICE.) Cornage was a species of grand-sergeantry in which the service rendered was to blow a horn to warn the king's subjects and rouse them to arms when the king's enemies (the Scots) crossed the Border. All these military tenures (saving the honorary services of grand-sergeantry) were abolished by statute 12 Charles II. cap. xxiv., by which it was enacted that all future tenures granted by the king or his heirs or successors should be by free and common socage.

Free socage—*plough-service* (see SOCAGE), is distinguished from the various kinds of knight-service in being determinate, while knight-service was precarious and uncertain. It is supposed to be a relic of Saxon liberty. Free socage is divided into several kinds, *petit-sergeantry*, *tenure in burgage*, and *gavelkind*. In petit-segeantry the tenure consists, as in grand-sergeantry, in some personal service rendered to the king; but in grand-sergeantry the service consists in actual performance, in petit-sergeantry in the rendering of something of the nature of a rent. The Dukes of Marlborough and Wellington held the lands assigned to them for military service by petit-sergeantry, each rendering annually a flag or ensign, which was deposited in Windsor Castle. Tenure in burgage is a tenure by rent from some lord of houses or lands formerly belonging to an ancient borough. There is a peculiar and ancient custom associated with some kinds of this tenure, supposed to be a relic of

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nomadic customs. It is called *borough-English*, as it is supposed to be an English in contradistinction to being a Norman custom. According to this custom if a tenant in burgage die intestate his youngest son inherits the whole reality situated within the borough. It is supposed to be derived from the circumstance that, among the pastoral people with whom it originated, the elder sons received their portion in cattle, and migrated during their father's lifetime, while the youngest remained with the father and inherited the domicile. Tenure by borough-English still prevails in Stafford and some other boroughs, though its abolition has been recommended by the real property commissioners. Gavelkind agrees with the other free socages in being a tenure by rent, but differs in being distributed equally among the sons, or failing them, amongst daughters or collateral heirs, instead of descending by primogeniture. (See GAVELKIND.) All those tenures agree with the other class of feudal tenures in being subject to *aids* (see KNIGHT-SERVICE) until abolished by the statute of Charles II., already referred to. Free socage is still subject to something in the nature of *relief*, which the heir pays to the lord on the death of the tenant. It amounts to one year's rent, and is paid whether the heir be a minor or not, the lord having no guardianship over the tenant by socage.

Villenage is divided into pure and privileged. Pure villenage is the origin of modern copyhold tenures (see COPYHOLD). The lord of a manor retained the actual occupation of as much land as was necessary for the use of his own family, which was called the *terra dominicales* or *demesne* lands, and distributed the remainder, except a portion left uncultivated for the mutual convenience of the lord and his retainers, called the *lord's waste*, among his retainers by two different titles, book-land (*boc-land*) or charter-land and folk-land. (For the origin of these tenures in Saxon times see FOLC-LAND.) The latter was held not by deed, but at the lord's pleasure. The tenants who held it were in the position of serfs or villains, the lord having the power of manumitting them. The lord of the manor held a court, called a court-baron, in which summary justice was administered, and the tenants were bound to attend this court as suitors or jurors. Their titles were attested by a copy of the court-roll, witnessed by the lord's steward, hence the modern name. The statute of Charles II. abolished tenure in villenage, but retained copyhold, which had become virtually a free tenure in respect to the persons of the holders, though subject to services in respect to the land, which were usually commuted into a rent. Copyholds when transmissible by inheritance, called copyholds of inheritance, are subject to reliefs, which are determined by custom, but must not exceed two years' improved value without deduction of land-tax. Copyholds are also subject to heriots. (See HERIOT.) *Privileged villenage* is a species of more ancient copyhold, which is held according to custom, not by the mere will of the lord. It consists originally of land held of the crown from the Conquest, called *tenure in ancient demesne*, of which the tenant cannot be dispossessed at the will of the lord, together with some other ancient copyholds possessed of similar privileges. It is divided into three classes—tenure in ancient demesne, privileged or free copyhold, and copyholds (in ancient demesne) of base tenure. The ecclesiastical tenures of the Saxons which still remain were tenure by *frankalmoigne*, held by religious corporations on condition of praying for the soul of the donor, and incapable of being held by a lay person; and tenure by *divine service*, which differs from frankalmoigne in prescribing some special religious service, as singing mass, giving alms, &c. (See FRANKALMOIGNE.) All property not copyhold is now called freehold estate, whether held for life or of inheritance. A tenant in *fee-simple* has the absolute, unconditioned, and freehold possession of a property to himself and his heirs for ever, and can dispose of his estate at pleasure by will or deed. A tenant by *fee-tail* has a limited inheritance, conditioned by the deed of entail. (See ENTAIL.) Joint-tenantry is the tenantry of two or more persons by one title; common tenantry, the ownership of several tenants by several titles; coparcenary arises commonly among female heirs, who inherit in common, not by primogeniture, but the share of each descends to her own heir. On the subject of land tenure in Scotland, see HOLDING.

The transfer of property is termed, both in English and Scotch law, *conveyancing*. The modes of acquiring property by English law are limited to descent and purchase, the latter term including all modes of acquiring property, except by descent. By 3 and 4 William IV. cap. cvi., for amending the law of inheritance, the word purchaser is declared to mean the person who last acquired the land otherwise than by descent, partition, escheat, or inclosure; and descent is declared to mean the title to inherit land by reason of consanguinity. Land acquired by purchase becomes transmissible by descent. The word land includes manors, advowsons, messuages, as well as chattels and other personal property transmissible by inheritance. The act 25 and 26 Vict. cap. liii. provides for the transfer of land by registration of title. The conveyance of property in Scotland is secured by a very complete system of records. The conveyance of lands in Scotland has been simplified by several acts passed in 1847, namely, 10 and 11 Vict. cap. xlvii., An Act to Amend the Law and Practice in Scotland as to the Service of Heirs; c p. xlviii., An Act to facilitate the Transference of Lands and other Heritages in Scotland not held in Burgage-tenure; cap. xlix., An Act to facilitate the Transference of Land and other Heritages held in Burgage-tenure. (See CONVEYANCE, DEED, SASINE, SEISIN, &c.) The laws relating to occupation and ownership of land in Ireland were amended by the Irish Land Act of 1870, supplemented by that of 1881. See IRELAND—Agriculture.

LANDAU, a fortress of Bavaria, in the Palatinate, 47 miles N.N.E. Strasburg. It is regularly and strongly fortified. It consists of substantial houses, and has straight and tolerably spacious streets, with several churches; Latin, agricultural, and industrial schools; an arsenal, barracks, and other military establishments; an hospital, house of correction; manufactures of tobacco and fire-arms, and oil and other mills. Landau was made a free imperial city by Rudolph of Hapsburg about 1290. It has been an object of contest in every great European war since the fifteenth century. Pop. 8749.

LAND-CRABS (*Gecarcinidæ*). These peculiar crabs are so called from their semi-terrestrial mode of life; their habits leading them to live on land, and away from the sea, even for considerable periods of time. They are crustaceans, allied in all points of essential structure to the familiar crabs. The chief modification observable in the land-crabs, is the presence in the interior of the cavity in which the gills are contained of leaf-like or foliaceous appendages, which keep the branchiæ or gills in a moist state, even when removed from the sea, by the retention of moist air admitted to the gill-chamber through a special aperture. There are various genera and species of land-crabs generally included in the family Gecarcinidæ, and these different kinds vary much in habits. Some forms inhabit mountainous slopes or woods, the majority of these crabs being found in situations of a moist or damp character. The true land-crabs

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(*Gecarcinus*) inhabit woody places. These animals occur in Asia, particularly in the Eastern Archipelago; in America, and specially in the West Indian islands; and in Australia also. The land-crabs represent forms which are almost solely terrestrial in habits; their visits to the sea being apparently limited to one annual migration, for the purpose of depositing their eggs. These crabs are chiefly nocturnal in habits, and live in the open woods, concealing themselves under the fallen stems and roots of trees. The periodical migration of these crabs to the sea in immense multitudes, proceeding in regular order, is described as a most extraordinary sight. One species, *G. rusticola*, is figured on Pl. LIV.-LV. Other species of land-crabs are, however, more peculiar in habits than the Gecarcinidæ. The *Cardisomæ*, represented by the common species (*Cardisoma carnifex*), and inhabiting the West Indian mangrove swamps and marshes, appears to feed upon both vegetable and animal diet. The cocoa-nuts and other fruits are destroyed in large quantities by these crabs, which burrow in the ground, in some cases for a considerable distance. The Cardisoma is said to have the disgusting habit of burrowing in the burial-grounds, and of feeding upon the dead bodies therein interred; the burrows of these crabs being stated to be commonly seen in West Indian cemeteries. The Cardisomæ are eaten by the natives, who set traps for them; and they are said to fatten the crabs for some time after capture, and previously to their being eaten. Among other species of land-crabs may be enumerated the Sand-crabs (*Ocypoda*), the Beckoning or Calling Crabs (*Gelasimi*), so named from their habit of holding up one of the large claws when irritated or disturbed; and the *Thelphusæ*, which inhabit fresh water streams, but appear to be equally at home when on land.

LANDER, RICHARD, the discoverer of the course of the Niger, was born at Truro, 8th February, 1804, and learned to be a printer. He accompanied Captain Clapperton as his servant on his second expedition into the interior of Africa, 1825–28. He started from the Bight of Benin with his master, after whose death at Soccatoo (April 13, 1827) he returned to the coast. In the spring of 1830 he set out with his brother John on an exploring expedition, under the auspices of the English government, and was landed at Badagry, near Cape Coast Castle. From this place they proceeded to Boossa on the Niger, and after ascending the river for about 100 miles, traced its course downwards to the sea, and proved that it entered the Bight of Benin by several mouths. They were the first also to discover that it was fed by the Benue. An account of this journey was published in 1832. In the beginning of 1834, while on a trading expedition in the delta of the Niger, he was wounded by the natives, and though he was able to reach Fernando Po, he died soon after. He published Records of Captain Clapperton's last Expedition in Africa, with R. Lander's Journal, 1829; Journal of an Expedition to Explore the Course and Termination of the Niger, 1832.

LANDERNEAU, a small seaport town of France, department of Finistère, 13 miles north-east of Brest. It has a Gothic church of the sixteenth century, a communal college, a large convent, and capacious marine barracks; and the quays are lined with fine houses. It has manufactures of linen, leather, &c., and a considerable trade. Pop. (1881), 9078.

LANDES. Landes is a generic name in French applied to a heathy or sandy plain incapable of bearing cereals. Landes are divided into two classes, *landes maigres* and *landes grasses*, the latter capable of some measure of cultivation, the former altogether unproductive. They are chiefly distinguished by the nature of the subsoil. The term landes is applied specifically to the large tracts of sandy or clayey soil extending along the ocean on the south-west of France, from Bordeaux to Bayonne. The maritime pine and the black oak grow in the sands along the coast, called *dunes*, and maize and rye are the only grains that can be cultivated in these sterile tracts. The landes are dry in summer, and marshy in winter. The inhabitants lead a sort of nomadic life. Stilts are used in traversing the landes.

LANDES, a department of France, bounded north by the department of Gironde, east by Lot-et-Garonne and Gers, south by Basses-Pyrénées, and west by the Bay of Biscay; it has an area of 3599 square miles. Landes contains three arrondissements, twenty-eight cantons, and 331 communes. The cultivable land amounts to 614 square miles, wood to 900 square miles, and landes to 1634 square miles. It is the second largest department in France, being only excelled in extent of territory by Gironde. Its minerals are of little importance, and the industry is chiefly agricultural; commercial products being few, and labourers ill paid. The fertile land consists chiefly of the alluvial valleys to the south of the Midouze and the Adour. From the Midouze and the Adour to the northern limits of the department stretches the district called the landes. The *dunes*, a sandy tract covered with pines, stretches along the coast of the department to a depth of about 3 miles. The vine is cultivated to a considerable extent in the fertile district. The annual product of wine is over 1,000,000 gallons. Pop. (1881), 301,143.

LANDGRAVE (German *Landgraf*), a title assumed by certain territorial counts of the German Empire to distinguish them from the inferior counts. There were originally three landgraves, those of Thuringia, and of Upper and Lower Alsace, who were princes of the empire. The title was assumed by Louis III. of Thuringia about 1130; it was assumed by the house of Hesse, afterwards divided into the landgraviates of Hesse-Cassel and Hesse-Darmstadt, about 1263.

LANDLORD and TENANT. The landlord in relation to a tenant is the person from whom lands or tenements are taken on lease (see LEASE), or by some other contract or agreement. The tenant is the person who holds lands or tenements of another by any kind of contract or agreement, usually for a periodical rent. In England houses may be let on a verbal agreement for any period not over three years. The conditions which are understood to subsist between landlord and tenant when no express stipulation is made, are chiefly the right of the tenant to the undisturbed enjoyment of the premises, and of the landlord to the stipulated rent. Assessed taxes, poor-rates, parliamentary or borough rates must be paid by the tenant under penalty of distraint. Water and gas companies in towns have generally also authority from Parliament to distrain for rates. Land tax, property tax, may be deducted from rent when they are paid by the tenant. In the absence of express agreement a tenant may sublet the property, but he is still liable to the landlord for the rent, unless the landlord relieves him by accepting the sub-tenant as a tenant-in-chief. Fixtures at the expiration of the lease belong to the lessor, and cannot be removed. (See FIXTURES.) The burden of repairs in the absence of express contract is thrown on the tenant. A sewers-rate for ordinary repairs falls on the tenant, for extraordinary repairs on the landlord. Without an express agreement the tenant is bound to continue the payment of rent though his premises are destroyed by fire, and the landlord refuses to rebuild them, but he is not bound to repair damages caused by tempest, lightning, or other

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natural casualty. Notice to quit is only necessary when no certain term is fixed for a tenant's occupancy. All such tenancies are held to be from year to year, which neither party can determine without half a year's notice. The half-year's notice to quit must be given so as to expire on the same quarter day as that on which the tenant took possession. Rent may be recovered by action at law, by ejectment, or by distress on the premises. In general, all goods found on the premises, whether the tenant's own property or that of another, may be distrained for rent, but the tools of a workman in actual use, the goods of a customer received in the way of trade, as corn at a mill, the baggage or equipage of a guest at an inn; also goods of a principal in the hands of a factor for sale, are free from distraint. Loose money, though on the premises, and personal property on the person, as a watch in a man's pocket, deeds, writings, or any kind of unsaleable property, cannot be taken in distraint. Perishable goods, which cannot be returned in the same condition in which they were taken, cannot be distrained. By 34 and 35 Victoria, cap. lxxix. (1871) a lodger whose goods have been distrained may recover them by furnishing to the superior landlord a declaration with inventory that the goods are his property, and that his immediate landlord has no interest in them, and by intimating what rent, if any, is due by him to his immediate landlord, and paying the same, or as much of it as may be necessary to satisfy his claim, to the superior landlord. If a landlord distrains articles of a disproportionately higher value than his claim he renders himself liable to serious damages. The distress must be made in the day-time, and after the due date of the rent distrained for. If a tender of arrears are made before the goods are impounded, the expense of the distraint must be paid by the landlord. The act 11 Geo. ii. cap. xix. provides penalties for fraudulently conveying away goods to avoid distress, but it is applicable only to the tenant's own goods, not to those of a lodger, nor does it affect a creditor of the tenant who may have removed some of the latter's goods with his consent, being apprehensive of a distraint. Goods may be impounded or placed in security on the premises; if removed notice must be given of the place to which they are removed. The action for recovering goods on distraint is called a *replevy*. The current year's rent must be paid by a creditor before he can remove a tenant's goods in execution. By 33 and 34 Victoria, cap. xxxv., rent is held, after 1st August, 1870, to accrue from day to day, and to be apportionable accordingly. In Scotland a verbal contract holds good only for a year. The landlord is responsible for maintaining a house in a fit state of repair, and if he neglects to do so the tenant may withhold the rent or deduct the expense of repairs. The tenant is not bound to pay rent if the premises are destroyed by fire. The tenant who takes a house is held bound to furnish it, and the landlord has a hypothec over the furniture for rent occurring before the term of payment has arrived, and may prevent its removal, but he has no lien over the goods of a sub-tenant who has paid his rent to his immediate landlord. Notice to quit must be given forty days before the term of removal, unless a different custom is established.

LANDON, Letitia Elizabeth (*Mrs. George MacLean*), better known to the lovers of poetry by her initial signature of L. E. L., was born at Old Brompton, London, in 1802, and brought up until the age of thirteen at Trevor Park, Herefordshire. After her return to London she began to contribute to the Literary Gazette, in which some of her poems appeared in 1820. They attracted much attention, and brought her pen into much request in periodicals, and particularly annuals, to some of which she furnished all the poetry. This excessive employment prevented her from giving her works a very perfect finish, and hence the most celebrated of them not only often betray careless versification, but harp too much on the same string, and indulge in the same veins of imagery. In June, 1838, she was married to Mr. George MacLean, and sailed with him to Cape Coast Castle in Western Africa, where he was governor. She died there on 15th October, 1839, soon after her arrival, from an accidental over-dose of prussic acid, which she had been in the habit of using medicinally. Of her works we may cite the Tale of Adelaide and other Poems, 1821; The Improvisatrice and other Poems, 1824; The Golden Violet, &c., 1827; The Venetian Bracelet, &c., 1829; The Vow of the Peacock, &c., 1835; Ethel Churchill, a novel, 1832; Romance and Reality, a novel, 1834; Francesca Carrara, 1834. A collected edition of her poems in four vols. was published in 1839. Her poetry, which had a great popularity, was chiefly characterized by a somewhat wild and intensely melancholy sentimentality, which gave rise to various sinister rumours as to her death; but it is said she was happy in her circumstances, and of a lively and cheerful disposition in private life.

LANDOR, Walter Savage, an English poet and prose writer, was born at Ipsley Court, Warwickshire, January 30, 1775. He was the son of Walter Landor, a gentleman of property in Warwickshire. In youth as in manhood Landor was wild and ungovernable. He was expelled from Rugby School and from Trinity College, Oxford, though he was afterwards one of the greatest masters of Latin composition in modern times. The army and the law were proposed as professions for him, but Landor preferred freedom and literature on a small allowance granted him by his father. In 1795 he published a small volume of poems, and in 1798 his poem of Gebir, which in 1803 appeared in a Latin version by himself. It had little success. On the death of his father he succeeded to the family property; but after spending large sums on improvements and on the building of a house, he became disgusted with the life of an English landlord, and in 1806, with characteristic impetuosity, he sold off all his property, and determined henceforth to live abroad. In 1808, when the Spaniards rose against France, he went to Spain to give his support to the cause of freedom. Having contributed a sum of money to the cause he received a colonel's commission, and was publicly thanked by the supreme junta for his services. On the restoration of Ferdinand and the subversion of the new constitution Landor threw up his commission, and left the country. In 1811 he married. Soon after his marriage he went to live at Tours, and in 1815 to Italy, where he spent many years, chiefly at Florence, near which city he bought a villa. Here most of his works were written. Landor seems to have married rather hastily. Between him and his wife there were incompatibilities of temper, and a quarrel finally led him to return to England, leaving his wife and family at Florence in possession of his villa and most of his fortune. In 1835 he took up his residence in Bath. In 1857 the publication (in Dry Sticks Fagoted by Walter Savage Landor) of some ugly slanders against a lady of Bath led to a prosecution for libel, and Landor was brought in for £1000 damages. He left England, and once more found a resting-place in Florence, where he died 17th September, 1864. It is difficult to form a just idea of the character of Walter Savage Landor. His savage denunciation of men and measures, and the many violent quarrels in which he was involved, offer a strange contrast to his well-known kindness of heart, and the real nobility and generosity of his nature.

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In truth the extravagant and paradoxical sentiments he uttered were frequently but the outcome of transient emotions by which, for the time being, he was carried away. His words had ever a tendency to outrun his thoughts. He seems also to have had within him an irresistible impulse urging him to run counter to commonly received opinions—in fact, as has been said, he was rather an ancient and a pagan than a modern and a Christian. His prose is much superior to his poetry. His Imaginary Conversations of Greeks and Romans (five vols. London, 1824–29, republished with additions in 1846), are the work by which his fame is chiefly secured, and will ever live as a model of a pure, vigorous, finished English style. It displays rich scholarship, ripe wit, brilliant imagination, and profound reflection; but, like his other works, is very unequal, and often sinks so far beneath its highest level, that Lord Jeffrey declared that it was one of the most remarkable instances he had seen of the strength and weakness of the human intellect, and that all its excellencies were rendered abortive by an utter want of temper, of self knowledge and decorum. His collected works in two vols., containing the Conversations, the Pentameron, Pericles and Aspasia, Hellenics, Gebir, Tragedies and Scenes, &c., were published in 1846. In 1851 was published Popery, British and Foreign; and in 1853 Last Fruit off an Old Tree. A biography of Landor by John Foster was published in 1869.

LANDRAIL, or CORN-CRAKE. See CORN-CRAKE.

LANDRECIES, or LANDRECY, a fortress of France, on the Sambre (navigable from this place), in the department Du Nord; 3692 inhabitants. Its situation renders Landrecy important in any war between Germany and France. Francis I. captured it in 1543, and it was again besieged by Charles V. in the same year. In 1655 it was taken by Turenne, and was ceded to France by the peace of the Pyrenees in 1659. In 1712 Prince Eugene besieged it, but Marshal Villars delivered it. In 1794 Landrecy was taken by the Prince of Orange, but recovered the same year. In 1815 the Prussians captured it after a short bombardment. The Prussians captured it also in 1871.

LANDSBERG, a town, Prussia, in the province of Brandenburg, and 37 miles north-east of Frankfurt, capital of a circle, on the Wartha, here crossed by a handsome bridge. It is walled, well built, has a court of law and several public offices, churches, a gymnasium, a poorhouse, lunatic and orphan asylums, manufactures of engines and boilers, carriages, woollens, tobacco, spirits, and some shipping trade. Pop. (1880), 26,612.

LANDSCAPE GARDENING is the art of laying out ground ornamentally for garden culture. Horticulture has two objects, the utilitarian one of rearing pot-herbs and esculent plants, which require more personal attention and superintendence than is bestowed on agriculture on a large scale; and the æsthetical one of rearing plants for the sake of their beauty of form and colour, their odours, and other attractions. Landscape gardening includes the general design of such ornamental culture, and embraces both the selection and laying out of the ground, and the subordination of the details of culture to a general plan. It is thus an art of considerable scope, affording great room for the development, under general principles, of taste, judgment, and genius for artistic combinations.

Although the art of landscape gardening is by no means one of the earliest fruits of civilization, its history can be traced to a remote antiquity. Egypt, the cradle of civilization, so far perfected her tillage that the banks of the Nile were adorned by a succession of luxuriant plantations from the cataract of Syene to the shores of the Delta; but this was not accomplished before Thebes, Memphis, and Heliopolis had risen in their magnificence, and the whole country been covered with stupendous pyramids, obelisks, and temples, still regarded as the wonders of the world. The hills and plains of Palestine were celebrated for beautiful gardens, but it was not until the walls and temple of Jerusalem announced the power and intelligence of the Israelites, and the prophets had rebuked their luxury and extravagance. The Queen of the East 'had heard of the fame of Solomon;' his fleets had brought him the gold of Ophir, and the treasures of Asia and Africa; the kings of Tyre and Arabia were his tributaries, and princes his merchants, when he 'made orchards,' 'delighted to dwell in gardens,' and planted the 'vineyard of Baalhaman.' The Assyrians had peopled the borders of the Tigris and Euphrates, from the Persian Gulf to the mountainous regions of Ararat, and their monarchs had founded Nineveh and Babylon, before we hear of the gardens of Semiramis. The Persian Empire had extended from the Indus to the Archipelago, when the paradise of Sardis excited the astonishment of a Spartan general, and Cyrus mustered the Grecian auxiliaries in the spacious garden of Celænæ. The Greeks had repulsed the invasions of Darius and Xerxes, and Athens had reached the height of her glory, when Cimon established the Garden of Academus and presented it to his fellow-citizens as a public garden. Numerous others were soon planted, and decorated with temples, porticoes, altars, statues, and triumphal monuments, but this was during the polished age of Pericles, when Socrates and Plato taught philosophy in the sacred groves; when the theatre was thronged to listen to the poetry of Euripides and Aristophanes; when the genius of Phidias was displayed in rearing the Parthenon and sculpturing the statues of the gods; when eloquence and painting had reached perfection, and history was illustrated by Herodotus, Thucydides, and Xenophon. Rome had subjugated the world and emulated Athens in literature, science, and the arts, when the superb villas of Sallust, Crassus, Pompey, Cæsar, Mæcenas, and Agrippina were erected, and the palaces of the emperors were environed by magnificent gardens.

The history of modern nations presents similar results. Horticulture long lingered in the rear of other pursuits. Most of the common fruits, flowers, and oleraceous vegetables which had been collected by the Greeks and Romans from Egypt, Asia, and other distant climes, were successively extended over Western Europe; but so gradual was their progress after the dark ages that till the reign of Henry VIII. scarcely any kitchen vegetables were cultivated in England, and the small quantity consumed was imported from Holland. Fuller observes that 'gardening was first brought into England for profit about the commencement of the seventeenth century. Peaches, nectarines, apricots, plums, pears, cherries, strawberries, melons, and grapes, were luxuries but little enjoyed before the time of Charles II., who introduced French gardening at Hampton Court, Carlton, and Marlborough, and built the first hot and ice houses. At this period Evelyn translated the Complete Gardener,' and a treatise on orange trees by Quintinyne; and having devoted the remainder of his life to the cultivation of his rural seat at Sayes Court, near Deptford, and the publication of his Sylva, Terra, Pomona, and Acetaria, he 'first taught gardening to speak proper English.'

In the Netherlands, France, Germany, and Italy a formal and very imperfect system of gardening was practised with considerable success, but was generally in a languishing condition throughout the world until the commencement of the eighteenth century, when

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it attracted considerable attention in Great Britain; but the establishment of the present style of horticulture is of very recent date. Principles of taste founded on a juster appreciation of nature as developed in the writings of Milton, Bacon, Addison, Pope, Kent, and Shenstone, were first applied by Bridgeman, Wright, Brown, and Eames. The improved art soon became popular, and gradually extended over Europe.

During the age of Cicero a formal kind of gardening prevailed characterized by clipped hedges and long avenues of trees. Pliny the Younger has given an account of his villa at Laurentum, and from the description it was rather distinguished for its numerous superb edifices, extensive prospects, and the systematical arrangement of the pleasure grounds, than for the improvements and decorations of the surrounding scenery, in accordance with those principles which are derived from a close observance of the pleasing effects of nature. The rural residences of the Romans appear to have been mere places of temporary retreat, and were planted with odoriferous flowers and shrubs, and ornamented rather by the architect than the landscape gardener. From the establishment of the papal government to the commencement of the thirteenth century the monks were the only persons who attended to ornamental gardening. After that period the style prevalent throughout Europe consisted in tall hedges, square parterres fantastically planted, straight walks, and rows of trees uniformly placed and pruned. In fact but little improvement was made from the time of the emperors Vespasian and Titus until the reign of George III. of Britain. It is true Hampton Court had been laid out by Cardinal Wolsey; Le Notre had planted Greenwich and St. James's Park during the reign of Charles II., and in that of George II. Queen Caroline had enlarged Kensington Gardens and formed the Serpentine river, but Lord Bathurst was the first who deviated from straight lines as applied to ornamental pieces of water by following the natural courses of a valley. Still what has been emphatically called the *Dutch system* universally prevailed, and the shearing of yew, box, and holly into formal figures of various kinds, and the shaving of river banks into regular slopes, went on until their absurdity became contemptible, and a better and more natural taste was induced. Verdant sculptures, regular precision in the distribution of compartments, and rectangular boundary walls, yielded to more chaste designs. Bridgeman succeeded to London and Wise, and became a distinguished artist, rejecting many of the absurd notions of his predecessors; other innovators departed from the rigid rules of symmetry, but it was reserved for Kent to realize the beautiful descriptions of the poets, and carry the ideas of Milton, Pope, Addison, and Mason, more extensively into execution. According to Lord Walpole he was painter enough to taste the charms of landscape, sufficiently bold and opinionative to dare and to dictate, and born with a genius to strike out a great system from the twilight of imperfect essays. He leaped the fence and saw that all nature was a garden. The great principles on which he worked were perspective, light, and shade. Groups of trees broke a too extensive lawn; evergreens and wood were opposed to the open ground, and by selecting favourite objects and veiling deformities he realized the compositions of the great landscape painters. Where objects were wanting to animate his horizon his taste as an architect could immediately produce them. His buildings, his temples, his seats, were more the work of his pencil than of science and practical skill. He bade adieu to all the stiff modes of canals, circular basins, and cascades tumbling over marble steps. Dealing in none but the true colours of nature, and seizing upon its most interesting features, a new creation was gradually presented. The living landscape was chastened or polished, not transformed. The elegant works of Repton, the unrivalled essays of Price on the picturesque, and the valuable publications of Gilpin, Madock, Sang, and Loudon, with those of many other writers on landscape and ornamental gardening, have had an extensive influence in promoting correct ideas of natural scenery. The taste of the present day, of which the works of Sir Joseph Paxton may be taken as an excellent example, is founded on a skilful use of natural advantages, and is opposed to much artificial and especially fantastic ornamentation.

The improved style of horticulture everywhere apparent in Great Britain attracted the attention of the other nations of Europe, and British gardening became the designation for all that was beautiful in that pleasing art—the synonym of perfection in rural culture. At the period when this new system of laying out grounds was gaining converts and began to be practically adopted, Viscount Girardin, a French military officer of high rank, travelled through England, and on his return he not only improved his seat at Ermenonville in conformity to that style, but published a work of great celebrity on the Composition des Paysages sur le Terrain, ou des Moyens d'embellir la Nature près des Habitations. The French style of laying out gardens had been settled by Le Notre during the reign of Louis XIV., and continued in repute for upwards of a century, for it appears to have been in vogue as late as 1770. The court and nation wished to be dazzled by novelty and singularity, and his long, clipped alleys, triumphal arches, richly decorated parterres, his fountains and cascades, with their grotesque and strange ornaments, his groves full of architecture and gilt trellises, and his profusion of statues, enchanted every class of observers. His principal works were the gardens of Versailles, Meudon, St. Cloud, Sceaux, Chantilly, and the terrace of St. Germain. Gray the poet was struck with their splendour when filled with company, and when the water-works were in full action; but Lord Kaimes says they would tempt one to believe that nature was below the notice of a great monarch. Le Notre was succeeded by Dufresny, who, differing considerably in taste from that great artist, determined on inventing a more picturesque style; but his efforts were rarely carried into full execution. After the peace of 1762 the English system began to pass into France, and portions of ancient gardens were destroyed to make way for young plantations *à l'Anglaise*. Laugier was the first author who espoused the English style, and the next in order was Prevôt. It was at this time that Viscount Girardin commenced his improvements at Ermenonville, and the change of the horticultural taste in France may be referred to the last quarter of the eighteenth century. The English style is that which may now be said to be the one universally followed. In recent times landscape gardening has had an excellent field for the display of its powers in the laying out of the numerous public parks that have been provided for many of our towns.

LANDSCAPE PAINTING. See PAINTING.

LANDSEER, SIR EDWIN, painter, grandson of a London jeweller, and son of John Landseer, a celebrated engraver, was born in London in 1802. As soon as he was able to hold a pencil he was set to draw animals from life. Hampstead Heath was the scene of some of his early studies, and on one of his early productions now at Kensington his father has inscribed that it was drawn at the age of five. In his eighth year he produced the Head of an Ass, which it is said would have been creditable to a

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grown-up artist. His early etchings have become rare. Some of his early studies appeared in the Sporting Magazine. Following the advice of Haydon he studied the Elgin Marbles, the 'Wild Beasts' in the Tower and Exeter Exchange, and dissected every animal whose carcass was obtainable. In the Academy's exhibition for 1815 the Portrait of a Mule, and the Heads of a Pointer Bitch and Puppy, were exhibited by Landseer, who had already distinguished himself as an etcher. In 1817 and 1818 he exhibited Brutus, a portrait of a dog; in 1818 he contributed several studies of animals to the Academy and the British Institution. In the latter year a picture exhibited at the exhibition of the Oil and Water Colour Society in Spring Gardens, Fighting Dogs getting Wind, secured great applause. In 1820 he painted his Dogs of St. Gothard. In 1821 he exhibited Ratcatchers, a Prowling Lion, and other works of great spirit. In 1822 he received the premium of £150 from the British Institution for The Larder Invaded. The Cat's Paw appeared at the Academy in 1824. It was sold for £100. Chevy Chase was at the Academy in 1825. In 1826 he was elected A.R.A., and in 1830 he became R.A. In 1827 he exhibited The Return from Deer-stalking; A Fireside Party, 1829; High Life, and Low Life, 1831; Spaniels of King Charles' Breed, A Jack in Office, 1833; Bolton Abbey in the Olden Time, 1834; The Drover's Departure, 1835; The Return from Hawking, and the Shepherd's Chief Mourner, in 1837; A Distinguished Member of the Humane Society, and There's Life in the Old Dog Yet, appeared in 1838; in 1840, Laying Down the Law; in 1844, Coming Events Cast their Shadows Before, and in 1846, The Stag at Bay; in 1849, The Forester's Family; in 1850, A Dialogue at Waterloo; in 1851, A Scene from the Midsummer Night's Dream; in 1853, Night and Morning, and The Children of the Mist. His later works include, Saved, Deer-stalking, A Flood in the Highlands, Wild Cattle at Chillingham, his celebrated work of sculpture the Lions in Trafalgar Square, and others. Landseer's pencil was unusually productive, and besides many greater works not here named he produced innumerable portraits of horses, dogs, and other animals. In 1850 he was knighted; in 1855 he received the gold medal of the Paris exhibition. He declined the presidency of the Royal Academy offered him on the death of Sir Charles Eastlake (1865). During his latter years he was a prey at intervals to nervous disease, and some of his last productions are not equal to those of an earlier period in his career. During his life the copyright of some of his works reached prices as high as £6000, which would now probably be exceeded. He died on 1st October, 1873. As is evident from his subjects enumerated his strength lay in the painting of animal life, and he excelled more in design than in colouring. In breadth and variety of treatment, and in humour and pathos, he excelled all competitors; but it is said he gave his animals expressions derived from human sentiments beyond the possibility of animal expression.

LAND'S END, a headland in Cornwall of about 60 feet in height, consisting of granite cliffs, and forming the western extremity of England. There is a lighthouse on the rocks, called Longships, about a mile to the west.

LANDSHUT, a town of Bavaria, in the circle of Nieder-Bayern, on the right bank of the Isar, here crossed by two bridges, 38 miles north-east of Munich. It is partly surrounded by old ramparts and ditches, and though an ancient place, having been fortified in 1204, and mostly built of brick, has two good squares, and two regular and spacious streets, opened into by others of an inferior appearance. The principal buildings and establishments are the palace, castle, townhouse, churches, one of them St. Martin's, a noble Gothic structure with a steeple 450 feet high; two monasteries, and a convent; a lyceum, gymnasium, and other schools; and an hospital. It has manufactures of leather, starch, tobacco, paper, cards, copperware, and surgical instruments; several mills, and numerous distilleries and breweries. Landshut was early a place of importance, became a ducal residence, and had a university, transferred in 1800 from Ingolstadt, but removed to Munich in 1826. Pop. (1880), 17,225.

LANDSHUT, a town of Prussia in Silesia, at the foot of the Riesengebirge, on the Bober. Is important for its linen trade. Landshut was walled in 1296. Laudon defeated the Prussians here, 23d June, 1760. Pop. (1880), 6697.

LANDSKRONA, a seaport town of Sweden, län Malmö, on a tongue of land projecting into the Sound, 18 miles N.N.E. of Copenhagen. It has fortifications of considerable strength, is well built, and contains a handsome church and courthouse. Its harbour, naturally one of the best on the coast, is secure and capacious, but much silted up. The chief exports are corn, fish, pitch, tar, timber, and alum. The industrial establishments, besides building yards, are soap-works, dye-works, tanneries, and a sugar factory. Charles XI. defeated Christian V. of Denmark here, 14th July, 1677. Pop. (1880), 9763.

LANDSLIP, the slipping or sliding of land, through the failure of supporting strata, from its original position. Landslips are due to a variety of causes. Water, particularly in its changing forms through frost and thaw, is the chief agent in their production. The wearing away of supports by water, the cracking of underlying materials by summer droughts, and the rending of existing crevices by the thawing of water frozen in them, are some of the commoner modes by which they are brought about. Sometimes a mass of land resting on an inclined bed slides for a considerable distance before it is arrested by a level surface; thus, in 1772, the Solway Moss, loosened by excessive rains, rolled over 400 acres of cultivated land, reaching in some parts to the roofs of the houses. The fall of the Rossberg in Switzerland, and the slip at Charmouth, near Lyme Regis, are other familiar instances.

LAND-SURVEYING. See SURVEYING and GEODESY.

LAND-TAX, a tax on land and houses imposed in the reign of William III. as a substitute for escuage, talliage, fifteenths, and other contributions. The tax was imposed on the basis of a valuation by counties made in connection with former subsidies, and which was very unequal. It was found that a tax of a shilling per pound on this valuation would yield a return of £500,000. On this basis the land-tax was imposed annually from 1693 to 1798, sometimes at the rate of 4*s*., sometimes of 3*s*., sometimes 2*s*., and more rarely (twice only) 1*s*., the rate for more than half the time being 4*s*. In 1798, by 38 George III. cap. lx., the tax, which by the annual act for that year was at the rate of 4*s*., was continued at the same rate as an annual charge on the land for ever, power being given first to the proprietors of the land to redeem it, and secondly, if not redeemed after a fixed period, to any other person to purchase it from the crown and levy it as a permanent charge or rent on the property. The terms of purchase or redemption were that the purchase-money should be regulated by the price of the funds, so as to produce an interest one-eleventh part more than the amount of land-tax purchased or redeemed. The purchase-money was to be applied to the redemption of the national debt. The tax falls on the beneficial proprietor of the land in proportion to the amount of

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his interest in it. If in arrear it may be levied from the tenant, who can deduct it from rent. Various changes have been made by successive acts in the conditions of redemption of the tax. 46 George III. cap. cxxxiii., provides for the exemption, at the will of the commissioners, of small livings and charitable institutions. 1 and 2 William IV. cap. xxi., provides for the relief, on application to the commissioners, of the land of Roman Catholics from double land-tax, to which it was subjected in the reign of William III. By 1 and 2 Victoria, cap. lviii. (1838), the powers of the commissioners appointed for the redemption of the land-tax were vested in the commissioners of the treasury. By 16 and 17 Victoria, cap. lxxiv. (1853), the terms of redemption were modified, the purchase-money being now an amount of stock in 3 per cent consols or reduced consols equal to £7, 10*s.* per cent less than the amount of consols which would yield a dividend equal to the tax redeemed. By 16 and 17 Victoria, cap. cxvii., the redemption or purchase of the tax is confined to persons having an interest in the estate or property on which the tax is charged. The proportion of the permanent land-tax assigned to Scotland was £47,954, which, like the English tax, is subject to the redemption. It is assessed in burghs by stentmasters, and in counties by the commissioners of supply.

LANDWEHR, a German term nearly equivalent to that of *militia*, means that part of the military force of a state which is not kept constantly under arms, but during peace follows ordinary trades, and is only summoned into active service on the breaking out of war or some internal emergency. The Tyrolese peasants, who on different occasions took up arms in defence of their emperor, appear to have been the first to whom the name of landwehr was applied. In 1805 Austria organized a similar landwehr for her other German provinces, and was greatly indebted to it for the services performed in the wars with Napoleon. This force in Austria is now under the control of the Minister of National Defence. A Russian landwehr was employed in 1812; a very complete and systematic development of this force was exhibited by Prussia in 1813–15. Such a force now exists over the whole German Empire. See Conscription and Germany—Army and Navy.

LANFRANC, Archbishop of Canterbury, a prelate distinguished by his learning and abilities as well as by his opposition to Rome, was born in 1005 at Pavia, and after having been for some time a professor of jurisprudence at Avranches assumed the cowl, and was elected prior of the abbey of Bec in 1046. In 1059 he entered into a dispute with Berengarius of Tours, at Rome, respecting the doctrine of transubstantiation, and maintained the controversy against him not only personally before the general council held in that city, but subsequently in his writings. Three years after, he exchanged his priory for the abbey of St. Stephen, at Caen, in Normandy; and when William, the sovereign of that duchy, acquired the English throne by conquest, the interest of that prince procured his election, in 1070, to the archbishopric of Canterbury. Lanfranc was an able politician as well as a munificent prelate. Through him the papal authority in England was made subordinate to the royal supremacy; thus, all bishops, as well as peers, were to pay homage to the king, and the clergy were to acknowledge no one as pope unless recognized by the king, and no ecclesiastic was to leave the kingdom without royal permission. He enjoyed the confidence of William, and promoted the peaceable succession of William Rufus, under whom he exercised the chief authority till his death. He died in 1089. His writings were printed in one volume folio, 1647.

LANGELAND, an island of Denmark, in the south part of the Great Belt, between the islands of Laaland and Fünen, about 30 miles in length, and from 3 to 5 in breadth; area, 103 square miles; pop. about 20,000. This island is fertile in every part. It is now only a county, but one of the best in the kingdom, and under the same governor as Fünen. Rudkjöping is the chief town.

LANGENDIJK, Pieter, said to be the only truly Dutch comic poet, was born in 1683, and spent the greater part of his life as a damask weaver. He cultivated the talents which nature had bestowed upon him with such success that even in his sixteenth year he produced a piece which long continued to keep its place on the stage It is entitled Don Quichot op de bruiloft van Camacho (Don Quixote at the marriage of Camacho). Others of his plays display much comic power, but none of his compositions have greater merit than his Herders-Visschers-en Veldzangen (Shepherds', Fishers', and Country Songs). He was in his sixty-sixth year when he was named historian to the town of Haarlem, and till his death in 1756 was always in straitened circumstances. His collected works were published at Amsterdam in four 4to vols.

LANGENSALZA, a town of Prussia, in the province of Saxony, 18 miles north-west of Erfurt, capital of a circle, on the Salza. It is walled, has six gates, a castle, three churches, four hospitals, a Latin school, bridewell, poorhouse, and orphan asylum; several courts and public offices, and manufactures of linen goods, serge, hosiery, starch, saltpetre, and gunpowder, and several dye-works and distilleries. Three battles have been fought in the vicinity; in 1761, 1813, and 1866. Pop. 10,538.

LANGHOLM, a market town of Scotland, Dumfriesshire, situated on the Esk, 30 miles east by north of Dumfries. It is well built; has a town-hall, jail, churches, and a school. There are several factories engaged in the tweed trade, on which the town principally depends. In the market-place is a monument to Sir Pulteney Malcolm, and on Langholm Hill is one to his brother, Sir John. Pop. in 1881 of Old and New Langholm, 4612.

LANGLANDE, or Longland, William (sometimes, but erroneously, called Robert), traditionally reported to have been a secular priest, educated at Oxford in the fourteenth century, the author of the Vision of Piers Plowman, or, as the fuller title expresses it, The Vision of William concerning Piers Plowman. From internal evidence it is gathered that the poem, in its earliest form, was composed about 1362. Its rhythmical structure depends upon alliteration, which forms a substitute for rhyme. The normal structure of the verse consists in the following points, although it is rather the exception than the rule to find them all combined in single lines. The full line consists of four accented syllables, with an irregular number of unaccented ones. It is divided into two hemistichs; the two accented syllables in the first hemistich, and the last accented syllable in the second, are preceded by unaccented syllables, while the first accented syllable in the second hemistich may or may not be so preceded. The two accented syllables in the first hemistich, and the first in the second, are alliterated. We give an example containing both regular and irregular lines:—

'Some putten hem to the plough,
Playden full seld,
In setting and sowing
Swonken full hard,
And wonnen that wasters
With gluttony destroyeth.
And some putten hem to pride,
Apparelled hem thereafter,
In countenance of clothing
Comen deguised

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In prayers and penances
Putten hem many,
All for the love of our Lord
Liveden full strait.'

The poem is allegorical in form and satirical in spirit; the trials and troubles of life generally, but more particularly the corruptions of the church and the worldliness of the ecclesiastical order, are its theme. On this account it acquired great popularity at the Reformation, and three editions of it were published in one year, 1550; but it is not in any doctrinal sense an anticipation of the Reformation. In Germany, France, and Italy, as well as in England, the vices of the clergy were always a favourite subject with satirists. Bocaccio and Chaucer exemplify this tendency of literature, but the author of Piers Plowman has the distinction of making the derelictions of the clergy his leading subject, although he satirizes other professions. The Crede of Piers Plowman is an imitation of Langlande's work which appeared about the end of the fourteenth century. It is written by a follower of Wickliffe. There are three chief texts of Piers Plowman, to which are assigned by the Rev. Walter W. Skeat, its latest editor, the respective dates of 1362, 1377, and 1399. These have all been published by the Early English Text Society (1867, 1869, and 1873), under the editorship of Mr. Skeat. The three texts increase in length consecutively, the last being very much longer than the first, but whether the additions are all by the original author is doubtful. An edition (including the Crede) with notes and glossary was published in 1842 by Thomas Wright, M.A., F.R.S. Wright's text corresponds most nearly to Mr. Skeat's 1377 text. This edition was republished with improvements in 1856. Piers Plowman, besides being of value for its pictures of old English life, is of very great importance for the study of English in its earlier forms.

LANGRES, a town in France, department of Haute-Marne, near the left bank of the Marne, 17 miles S.S.E. of Chaumont. It occupies a steep hill commanding the entrance from the basin of the Saône into that of the Seine, and has a loftier site than any French town except Briançon. It is nearly of an oval shape, and generally well built, consisting of wide, regular, and clean streets. Its principal edifices are a very ancient cathedral, chiefly Romanesque but partly Gothic; a handsome modern townhouse, a communal college, and a museum occupying an ancient church. Its staple manufacture is cutlery, and its trade is chiefly in corn, flour, wine, flax, hemp, cattle, whetstones, &c. Many Roman remains have been found here. Pop. 11,796.

LANGTON, STEPHEN, Cardinal, and Archbishop of Canterbury in the reign of John, whose disputes with the Papal see originated in his rejection of this prelate's appointment. By birth Langton was an Englishman, but he received his education in the French metropolis. In the university of that city he had risen gradually, through various subordinate offices, to the chancellorship, when, on going to Rome, the learning and abilities which had hitherto facilitated his advancement raised him so high in the favour of Innocent III. that the pontiff, in 1206, not only elevated him to the purple, as cardinal-priest of St. Chrysogenus, but presented him to the vacant primacy of England, respecting the disposal of which the king was then at variance with the monks of Canterbury. He was consecrated at Viterbo on 17th June, 1207. John refused to confirm the nomination, seized on the temporalities of the see, and ordered the monks to depart the kingdom. A sentence of excommunication upon himself and his whole realm was the consequence; nor was it removed till the weak monarch, alarmed by the warlike preparations of France, and the general disaffection of his subjects, gave up every point in dispute, and reconciled himself to the church. Langton was acknowledged by John in July, 1213, and in August he joined the insurgent barons. He was also a strenuous defender of the privileges of the English church, which afterwards embroiled him in disputes with the pope. He crowned Henry III., and in 1223 he demanded of him the full execution of the charter. He was the author of some theological treatises. He died 9th July, 1228.

LANGUAGE (derived through French *langage*, from Latin *lingua*, the tongue) is the expression of ideas by words or significant articulate sounds for the communication of thought. It is an intelligent effort to raise in the mind of another concepts or ideas of objects, acts, conditions, or relations by means of audible signs associated with, and so suggestive of, such objects of thought. Man alone of all animals is endowed with this faculty. Metaphorically the term language has been extended to every other mode by which ideas may be made to pass from mind to mind. Thus we say 'the language of the eyes,' 'the language of signs,' 'the language of birds and beasts.' Even silence, by a bold metaphor, has been assimilated to language by one of our British poets:—

'Come, then, *expressive* silence, *muse* his praise.'—*Thomson.*

In an analogous sense philologists call the communication of ideas by writing *written language*, in contradistinction to language properly so called, which they denominate *spoken language*. It is certain that ideas may be communicated by signs representative of sounds, which word *representative* must not, however, be taken literally, because there is no point of contact between the sense of seeing and that of hearing; all that can be said is that, by tacit convention, certain visible signs are made to awaken in the mind the idea of certain audible sounds, which sounds, by another tacit agreement, awaken the ideas of physical objects or of moral perceptions. Thus the eye operates on the mind through the medium of the ear; but the process is so rapid that it is not perceived at the time, and writing may be said even to be a quicker mode of communication than speech, for the eye can run over and the mind comprehend the sense of a page of a printed book in a much shorter space of time than the words which it contains can be articulated. Still the passages of ideas from the eye to the mind is not immediate; the spoken words are interposed between, but the mind does not perceive this in the rapidity of its working.

The same principle applies equally to those modes of writing which philologists have denominated *ideographic*, by which it would seem to be implied that ideas are immediately transmitted through the eye to the mind. Among those is classed the Chinese. But it is well known that every one of the numerous characters of which that writing consists awakens in the mind the idea of a syllable which it is meant to represent; and that syllable, in speech, represents a spoken word or part of a word. Thus, in this instance, the ear (the mental ear) is also an intermediate agent between the eye and the mind. (See the articles HIEROGLYPHICS, PHILOLOGY, and WRITING.) The same may be said of the Egyptian hieroglyphics. For a long time it was believed that every one of those signs was the representation of an idea, until the researches of the younger Champollion afforded the most complete proof of their having been chiefly used as alphabetical characters, although their forms indicate a different destination. It would seem that it was originally intended to employ them to represent ideas, not abstractedly, but through words or sen-

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tences of the spoken idiom; for wherever a language exists, and all nations have spoken before they wrote, ideas can only occur to the mind in the shapes given to them by the peculiar structure and grammatical forms of that language. That might easily have been done to a certain extent. There was no difficulty in devising signs to awaken in the mind the idea of the sun, the moon, a tree, a house, or other object perceptible by the sense of sight; physical and even moral qualities might be expressed metaphorically, as they are in speech; and even some abstract ideas might be represented, as they are with us by our algebraic characters. But this mode of communication was necessarily very limited, and its sense as well as its method could only be explained by means of spoken words. This led to an easier process, and the hieroglyphics were turned into alphabetical letters. A number of them continued to be employed in the former mode; as in our almanacs we have characters representing the sun, the moon and her phases, various stars, and the signs of the zodiac. These are hieroglyphics to all intents and purposes, and every written language (if we may use the term) has more or less of them. The Egyptians have employed them in greater abundance than any other nation. Still those signs awakened ideas in no other forms than those in which they presented themselves to the mind when clothed in words; hence we are informed by Champollion that there were hieroglyphics significative of the articles which, in the Coptic language, are prefixed to substantives. But the article is a part of speech not at all necessary in language, since there are idioms (the Latin, for instance, and amongst modern languages the Russian) that are entirely without it; so that it is evident that even hieroglyphic signs were invented to represent words in the first instance, and ideas through them. Of what is called the *Mexican picture-writing* we know too little to speak very positively. Unfortunately the key to those hieroglyphs, which was preserved for a long time after the conquest of Mexico, is now lost. Therefore we cannot say how they were connected with the spoken language. But that such a connection must have existed it is impossible to doubt; otherwise the Mexicans could not, as it is known they did, have communicated by mere pictures of visible objects the history of their empire from generation to generation. The few hieroglyphic signs which North American Indians cut or paint on the bark of trees, to inform each other of the number of their enemies, of the course they are pursuing, and of the number of scalps they have taken in battle, are so limited in their objects that they only serve to show the difficulty of establishing a similar mode of communication on a more extensive scale. It would soon produce confusion unless a method were connected with it based on the structure and on the grammatical forms of the spoken language. This alone could class the signs in the memory, and furnish a clew to their different significations as applied to various objects, cases, and circumstances. It must be otherwise, however, when men, in consequence of some natural defect—as the deaf and dumb, for instance, have no idea of sounds, and therefore are without a spoken language. Here their ideas are formed from the recollection of the perceptions which they have received through other senses than that of hearing. They, however, invent signs to communicate with each other, either through the organs of sight or by means of touch. It has been observed that many of those signs seem to have been taught by nature, and are the same in countries far distant from each other. These are to sight and feeling what onomatopoeias are to sound, and are much more numerous, because more abounding in analogies. Others of those signs are arbitrary, and that is where analogies either entirely fail, or are more obscure and less perceptible. All of them, however, are very limited, and if the deaf and dumb were left to themselves would not enable them to enlarge the circle of their ideas. But the admirable art by which they have been taught to understand our languages through the application of the sense of sight, and to comprehend the mysteries of their structures and their forms, has opened to them a world of ideas to which they were before entirely strangers, and has enabled them to combine them with method, compare them with precision, and draw from them correct inferences. To them words are not sounds, but groups of little figures, which class themselves in their minds, and become a medium by which not only to increase the number of the visible signs by touch or gesture, through which they before communicated together, but to improve and methodize them to a degree which, without the knowledge of language, they never would have attained. This language of signs, in our deaf and dumb asylums, has received a degree of perfection which in some respects, particularly in the rapidity with which ideas are communicated, places it above speech, although in others its inferiority cannot be denied. Those advantages it has derived from the knowledge of the forms and method of spoken language, obtained through its written image. It follows, from what has been said, that speech alone is properly entitled to the name of language, because it alone can class and methodize ideas, and clothe them in forms which help to discriminate their various shades, and which memory easily retains; that written signs or characters, invented by men who can speak, will naturally awaken ideas in the forms in which their language has clothed them, so as to convey them to the mind through those well-known forms, and consequently through the words or sounds to which they have been given. Those who are deprived by nature of the sense of hearing will make the best use they can of the senses which they possess. We have even known a young woman, born deaf and blind, who, to a certain degree, could understand and make herself understood by means of touch; but otherwise speech is the basis of all other modes of communication between men, and all of them, whatever be their forms, reach the mind only through the recollection of ideas as clothed in the words of a spoken language.

Philologists are almost agreed that language has its origin in onomatopoesis—that is, in conscious or unconscious imitation of natural sounds, the primary elements of language being of unconscious origin, and therefore purely interjectional. But it is only when the imitation is conscious, and more especially when the imitative sound is employed to raise a concept of something not present to the senses in the mind of a third party, that the process is entitled to the designation of true language. Concrete objects are first recognized, distinguished, classified, and named. But a root or a simple primitive word cannot describe a complex object synthetically—that is, a name cannot be applied to it which shall body forth all its observed qualities. Language begins with analysis and the apprehension of sensible qualities, and names each object from the quality most prominently characterizing it. In their origin, therefore, nouns, which are the earliest parts of speech, are abstract; nouns expressive of action, or verbal nouns, having the precedence of all others. The simplest roots are those which imitate the cries of animals and other natural sounds, and these would be the first formed. Gradually as man's powers of observation became enlarged and his mental faculties developed, so that he could perceive analogies, roots acquired a secondary

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and figurative meaning, and were applied to the phenomena in himself, in his fellow-creatures, and in nature surrounding him. The apprehension of an abstract quality, physical or moral, implies a mental operation. Language, then, consists of external and sensible signs for internal acts—for concepts, ideas, and mental processes—and so becomes the spoken means by which thought is communicated. The following sentences from Mr. Hewitt Key's 'Language: Its Origin and Development' present these views with considerable clearness:—'It is all but universally admitted that some portion of language owes its origin to an imitation of the sounds of nature. The *moo-cow* and the *baa-lamb* of the child, the *cuckoo*, the *pee-wit*, the *whip-poor-will* of North America, and the *tuco-tuco* of South America are simple but irresistible examples of this law. But here one is at once met by the objection that though such an origin is readily conceived in the case of giving names to living creatures, or to those acts which have their special noise, as scratching, thumping, lisping; yet how can provision be made for terms which belong to the other senses, as, for example, that of the eye, and still more for the conceptions of the mind? The best answer to such an objection is the simple answer of examples. Now, when a stone tied to a string is whirled violently round the ear catches very distinctly a sound which we may represent by the utterance of the noise *whirr*, and the more so if we roll out the final liquid. Such a sound, especially if accompanied by a circular movement of the hand, would serve as a natural symbol of the idea of revolution; but more than this, the sound is one which actually plays a part in existing languages, and that to an extent which to my mind is irresistibly convincing. For example, the German has *wirren*, to twist, the French *virer*, the English *veer*, as the weathercock, and to *wear* (a ship). The same sound forms an important part of *whirl*, *whorl*, *world* (the round globe), *warp*, *worm*, in the double sense of the wriggling creature so called, and the helix of a screw; *wort*, in the sense of root, as spider-wort. It is also heard in the initial letters of *writhe*, *wreath*, *wrench*, *wrest*, *wrist*, *wring* (a towel or a bird's neck), *wriggle*, *wrap*, *wry*. The Latin exhibits the same in *uertere*, in *uermis*, a worm, in *uerminari*, which unites the two meanings 'to breed worms' and 'to writhe with pain;' both uses, however different in their application, involving the idea of turning. The adjective *uarus*, 'with crooked legs,' and *uarices*, 'varicose veins,' have the same origin. . . . But so far we have for the most part only physical ideas represented by our assumed root and its derivatives, in which all can be clearly explained by sound alone. I pass to ideas of a visible character. The three English words *vermilion*, *carmine*, and *crimson*, which deal with the sense of sight, owe their origin to a noun which in Latin appears as *uermis*, in Sanskrit as *krimi*, 'a worm,' for the coccus of the East, like the cochineal of Mexico, was known to commerce only in its dead form, and under the name *kermes* passed for a dried worm. Indeed the Latin *uermiculus* already carried with it the notion of scarlet, alike in St. Jerome's letters, lxiv. 19, and in the Vulgate, Ex. xxxv. 25, where again the Hebrew has *tolâhat*, in the same sense of scarlet, yet a word strictly meaning a worm.'

Roots are of two kinds, *verbal* or *notional* and *pronominal* or *relational*. The former class of roots name things and acts, the latter relations. The modes in accordance with which roots are combined or modified in order to indicate relation, time, number, &c., give rise to the classification of languages. There are three great divisions or classes:—(1) MONOSYLLABIC, in which each word is a simple uninflected root. The monosyllabic languages are the *Chinese*, *Cochin-Chinese*, *Siamese*, *Burmese*, *Tibetan*, and the tongues of several inferior tribes. (2) AGGLUTINATE, or POLYSYNTHETIC, in which two or more significant words coalesce into one, the compound expression never attaining perfect unity. This class of tongues is variously denominated *Turanian*, *Scythian*, *Mongolian*, and *Tataric*, and comprises five or six branches:—(*a*) The *Ugrian* or *Finno-Hungarian*, including Lapp, Finnish, Magyar or Hungarian, and the kindred tongues of the Ostiaks and Woguls; (*b*) *Samoyedic*, spoken by tribes along the north coast of Europe and Asia, from the White Sea to the Lena; (*c*) *Turkish*, reaching from the eastern edge of Austria through Asia Minor and Tartary to beyond the centre of Asia. This branch is subdivided into three groups, *Northern*, *South-eastern*, and *Western*, all nearly allied. The western group extends through North Persia, the Caucasus, Crimea, Asia Minor, and Turkey. (*d*) *Mongolian*, spoken by tribes from Tibet to the borders of China; (*e*) *Tungusic*, pervading a broad tract of North-east Asia, the most conspicuous dialect of which is the Manchu, spoken by the tribes who in 1644 made the conquest of China; (*f*) possibly *Draridian*, spoken in Southern India and Ceylon, comprising Telinga or Teluga, Canarese, Tamil, Malayâlam or Malabar. Some philologists, however, consider the Dravidian group as belonging to the Aryan stock. (3) INFLECTIONAL languages, divided into two branches:—(A) *Trisyllabic* or *Tri'iteral* (or *Semitic*) tongues, in which the verbal root consists of three letters, modified by the interpolation of vowels appended to the root. Thus, in Arabic, *q-t-l* forms a verbal root meaning killing; then *qata'a* means he killed; *qatila*, he was killed; *aqtul*, kill; *qitl*, enemy, &c. The Semitic class has three branches—(*a*) *Northern*, *Aramaic*, or *Chaldean*, comprising dialects of Syria and Assyria; (*b*) *Central* or *Canaanitish*, comprising Hebrew, Canaanitish proper, Phœnician, and Punic; (*c*) *Southern* or *Arabic*, comprising Arabic proper, Himyaritic, literary Ethiopic or Geez, Amharic, and other Abyssinian dialects. (B) *Inflectional* languages properly so called, in which time, person, number, mood, gender, degree of comparison, case-relation, &c., are represented by affixes, originally independent and significant words, but now non-significant of themselves, and having meaning only when appended to a verbal root, the root itself frequently undergoing variations in form. This group of tongues, called also *Aryan*, *Indo-European*, and *Indo-Germanic*, comprises seven branches:—(*a*) *Indic*, comprising dialects of Hindustan proper, with Pali, the sacred language of the Buddhists; Prakrit, the language of the vulgar in Sanskrit dramas; and Sanskrit or sacred language of the Brahmans, the mother of all the Indic group: (*b*) *Iranian*, comprising Zend or Avestan, in which the Zend-Avesta of Zoroaster is written; Pehlevi or Huzvaresh (later Zend); Persian in all its branches, with Armenian, Kurdish, Ossetic (a dialect of the Caucasus), and Afghan or Pushto: (*c*) *Greek*, comprising ancient Greek and modern Greek or Romaic; (*d*) *Latin*, comprising Latin proper, Italian, French, Spanish, Portuguese, Provençal Rhæto-Romanic (South Switzerland and head of Adriatic), Wallachian, &c.; (*e*) *Slavonic*, divided into *Eastern*, comprising Russian, Polish, Bohemian, Servian, Bulgarian, and Old Bulgarian, otherwise called Old or Church Slavic, and still employed as the sacred language of the Greek Church; and *Western*, comprising Lithuanian, Lettish, and Old Prussian (now extinct): (*f*) *Teutonic*, divided into two great branches—*German* and *Scandinavian*. The *German* branch is divisible into three principal dialects, *Mœso-Gothic*, *Low German*, and *High German*. Mœso-Gothic, the most easterly of all the German dialects, has long ceased to be spoken, but is preserved in the transla-

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tion of parts of the Scriptures made by Ulfilas in the fourth century. Low German, spoken by the inhabitants of the low or flat country near the shores of the German Ocean, comprises Anglo-Saxon or early English, Frisian, Old Saxon (Heliand), Dutch, and closely-allied Flemish. High German, the dialect of the people of the higher country in the interior, is divided into three periods, Old High German (from the seventh to the eleventh century), Middle High German, the language of the Nibelungenlied (from the twelfth century to the Reformation), and New High German, which, since Luther's translation of the Bible, has been the literary language of Germany. The *Scandinavian* branch comprises Old Norse or Icelandic, Norse or Danish, and Swedish. (*g*) *Celtic*, divided into two groups—*Gadhelic*, comprising Irish, Gaelic, and Manx; and *Cymric*, comprising Welsh, Breton or Armoric, and Cornish (now extinct).

There are many outlying or allophyllian groups of languages not yet classified, but mostly polysynthetic, as Japanese and cognate tongues, Australian or Alforas, the Hamitic group, comprising the Hieroglyphic language of ancient Egypt, Coptic, Libyan or Berber, &c.; South and North African, native American, and especially the Basque, supposed to be the sole relic of the tongue spoken by the Iberians before the immigration of the Aryans into Europe, the Old Etruscan, &c. All languages were originally monosyllabic; inflectional tongues have passed through the agglutinate stage, and have a tendency again to return to the monosyllabic state, English of all exhibiting this tendency in the greatest degree.

Language is a guide, but by no means a sure one, in estimating the relationship existing between different peoples. Thus, comparing the English with the Frisian language, we assume that we are more closely related to the Frisians than to any other people. But Cornishmen are a Celtic race, and yet they speak a Germanic tongue. See article ETYMOLOGY.

LANGUEDOC, an extensive and beautiful province of France, now forming the departments of Aude, Tarn, Hérault, Lozère, Ardèche, and Gard, as well as the arrondissements of Toulouse and Villefranche, in the department of Haute-Garonne; and the arrondissements of Puy and Yssingeaux, in the department of Haute-Loire. Under the Romans it was one of the seven provinces of Gaul which had the freedom of Italy. The Goths obtained a grant of it from the Emperor Honorius, and retained possession for nearly two centuries. The Saracens afterwards became its masters, but were expelled by Charles Martel in 725. From the counts of Toulouse it passed to Philip the Bold, and was finally united to the French crown in 1361.

LANIARD, or LANNIERS, a short piece of rope or line fastened to several machines in a ship, and serving to secure them in a particular place, or to manage them more conveniently: such are the laniards of the gun-ports, the laniards of the buoy, the laniard of the cat-hook, &c. The principal laniards used in a ship are those employed to extend the shrouds and stays of the mast by their communication with the dead-eyes and hearts, so as to form a sort of mechanical power resembling that of a tackle.

LANNES, JEAN, Duke of Montebello and Marshal of France, was born in 1769 at Lectoure, studied at the college there, but in consequence of his parents having lost all their property, was obliged to learn the trade of a dyer. In 1792 he joined the army of the Pyrenees, and so greatly distinguished himself that in 1795 he was colonel, and held the command of a brigade. He afterwards joined the army of Italy, and soon attracted the notice of Bonaparte. Having distinguished himself at the battle of Millesimo in 1796, he obtained the rank of adjutant-general. After the Peace of Campo Formio he accompanied Bonaparte to Egypt, obtained a command in Kléber's division, and on several occasions added greatly to his military reputation. On the 18th Brumaire he rendered very important services to Bonaparte, and was rewarded with the command of the tenth military division at Toulouse. In 1800 he was made chief of the consular guard, and in the campaign of that year led the advanced body of the army over St. Bernard, pressed forward to Turin, and then defeated the enemy at Montebello, from which he afterwards took the title of duke. At Marengo he commanded two divisions, and contributed greatly to the victory. In 1801 he went as minister plenipotentiary to Lisbon, and after his return in 1805 received the command of the advance division of the grand army in the campaign against Austria. Here he crossed the Rhine and the Danube, shared in the battle of Wertingen, and took Ulm, Brunau, and Linz. In the battle of Austerlitz he commanded the left wing, and in that of Jena the centre. When the Russians advanced to support Prussia he pressed forward into Poland, entered Warsaw, and defeated the enemy at Pultusk. A severe wound obliged him to remain for some time inactive, but in 1807 he took the command of the reserved corps, and forced Dantzig to capitulate. In 1808 he accompanied Napoleon into Spain, defeated Castanos at Tudela, and reduced Saragossa. In the campaign of 1809 against Austria he commanded two divisions at the battle of Eckmühl. In the battles of Aspern and Essling he commanded the centre. During the subsequent retreat he was mortally wounded, and nine days after died at Vienna.

LANNION, a seaport town, France, in the department of Côtes-du-Nord, 35 miles W.N.W. of St. Brieuc, on the right bank of the Guer, a little above its mouth in the English Channel. It has a court of first resort, an agricultural society, and a communal college, and a harbour of easy access; carries on a considerable trade, and has manufactures of linen, hats, ropes, leather, and refined wax. Pop. (1881), 5998.

LANSING, a town of the United States, capital of the state of Michigan, on Grand River, and on the Amboy, Lansing, and Traverse Bay Railway, 110 miles north-west of Detroit. It contains several churches, a large and handsome state-house, a house of correction, a female college, and an agricultural college, to which a farm of 700 acres is attached. It has also carriage factories, tanneries, breweries, and flour, planing, and saw mills. Population in 1880, 8319.

LANSINGBURGH, a town, United States, New York, Rennselaer county, on the east bank of the Hudson, opposite Waterford, with which it is connected by a bridge, and on the Troy and Boston Railway 10 miles above Albany. There are extensive manufactures of brushes, oil-cloth, &c. Population in 1880, 7432.

LANTERN, in architecture, is an erection on the top of a dome or the roof of an apartment to admit light or promote ventilation. It may be either circular, square, elliptical, or polygonal.

LANTERN-FLIES (*Fulgora*), a genus of insects included in the Homopterous subdivision of the order Hemiptera; this latter group being represented by such insects as the plant-lice or Aphides, the cochineal-insect (*Coccus*), the land and water bugs, &c. The lantern-flies are distinguished by the great prolongation of the head, which appears to be furnished with a long blunt snout. The antennæ or feelers are situated below the eyes, and are of small

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size, and formed of but few joints. The mouth is retroverted or turned backwards, the prominent beak springing from the hinder part of the head. The front wings are wholly membranous, the hinder wings being folded under the front ones when the insect is at rest. The female possesses an *ovipositor*, or terminal organ, for the purpose of incising the bark of plants, in order to deposit the eggs in the slits thus made. The ovipositor is three-bladed, the blades being serrated or toothed. Of the lantern-flies the best known species is the *Fulgora laternaria*, of Guiana and tropical America. The chief evidence upon which the assertion of the luminosity of these flies rests are the statements of Madame Merian, who gave an account of her astonishment at beholding a number of these flies giving out a luminous light at night when inclosed in a box. The light appeared to be emitted from the peculiar front prolongation of the head. It is but right to state, however, that the luminosity has not been generally observed since Madame Merian's observation, and entomologists have not been at all ready to admit the occurrence of the phenomena in these insects; although, on the other hand, the *Fulgora candelaria* of China has been independently stated to be luminous. In the latter species the light has been stated to proceed from the protruded head, as in the case of the South American kind. Europe possesses small species of *Fulgorina*, in which the occurrence of luminosity has not been fully or definitely ascertained. But considering the verified occurrence of luminosity in other members of the insect class, there appears no obstacle to admitting the *possibility* of its occurrence in the lantern-flies. All that is required is the actual and verified *observation* of the fact.

LANTHANUM (Greek *lanthanein*, to escape notice), one of the rare chemical elements, occurs always associated with didymium and with cerium, in consequence of which it was overlooked, till it was perceived by Mosander to be a distinct element. It is obtained from the minerals in which it occurs, and is separated from its associated elements by the process described under DIDYMIUM. Metallic lanthanum is obtained from its anhydrous chloride by the action of sodium. It forms a dark gray, soft powder, which can be made to adhere by pressure. Lanthanum forms only one series of compounds, such as the oxide, chloride, and sulphide. The first is a white mass, which is highly hygroscopic, and which also absorbs carbonic acid gas. The hydrate is a white, gelatinous precipitate. There is said to be a peroxide of lanthanum, but its exact composition is unknown. The chloride is a crystalline, rather deliquescent substance, which, if heated, loses water and hydrochloric acid, being converted into a basic chloride. The sulphide is a yellow or bright orange powder, which is decomposed by water. The other salts are prepared from the oxide. They are white, and colourless in solution; the borate, carbonate, and phosphate are insoluble in water. No use is made either of lanthanum itself, or of any of its compounds.

The mineral called *lanthanite* is a hydrated carbonate of lanthanum. It occurs as an earthy crust or in four-sided plates, along with *cerite*, at Bästnäs, in Sweden, and in fine plates in New York, Pennsylvania, and other localities in America.

LANZAROTE, the most north-eastern of the Canary Isles, about 90 miles from the African coast; greatest length, 36 miles; mean breadth, 15 miles. Its coast is in general very bold, and presents ranges of basaltic cliffs rising in some parts to 1500 feet; its interior contains several mountains, the loftiest of which has a height of 2000 feet. They are all of volcanic origin, and several of them have recently been active. The soil is naturally fertile, and in rainy years produces most luxuriant crops, but the drought unfortunately is often so long and severe as almost to destroy vegetation. The wine in good years amounts to about 1500 pipes, and is equal at least to any produced in the Canaries. The only port of any consequence is Arrecife. Pop. 17,500.

LANZI, LUIGI, a celebrated archæologist, was born at Treia, in the Mark of Ancona, 14th June, 1732, and became a pupil of the Jesuits and a member of the order. He made himself master of the whole field of classical studies, and the ruins of Rome awakened his curiosity to the examination of the remains of ancient art, in treating of which he evinced profound learning and critical acuteness. From Rome Lanzi went to Florence, and made himself acquainted with all the master-pieces of art collected there. In 1782 he published a Guida della Galleria di Firenze, which not only satisfied the inquirer by its extensive learning, but amused the mere searcher after pleasure by its pleasing descriptions. He was chosen president of the Academia della Crusca in 1807 on account of the purity of his language. A patriotic feeling had engaged Lanzi in the study of Etruscan antiquity, which was then little cultivated. Learned Tuscans in the middle of the eighteenth century had attempted to elevate Etruscan civilization by maintaining that the Etruscan religion and mythology were entirely unaffected by Grecian influence. Lanzi's researches led him to form a different opinion. The remains of the Etruscan language and art denoted in his opinion a Grecian origin, and he openly maintained the prevailing influence of Greece on Etruscan civilization. A critical method and profound erudition render his Saggio di Lingua Etrusca e di altre antiche d'Italia, per servire alla Storia de' Popoli, delle Lingue e delle Belle Arti (Rome, 1789, three vols.), a classical work. Lanzi next undertook a history of the art of painting in Italy, at the suggestion of the Grand-duke of Tuscany. Of this Storia pittorica dell' Italia dal Risorgimento delle Belle Arti fin presso al Fine del XVIII. Secolo, the third edition was published at Bassano in 1809 in six vols., with his own last additions. The first edition appeared in 1795. An English translation by Thomas Roscoe appeared at London in 1828. His Inquiries respecting the Ancient Vases commonly called Etruscan (Florence, 1806), is a work of great learning, the most valuable treasures of which have been still more generally diffused by Millin. He also published Latin Inscriptions, a translation of Hesiod's Works and Days, and some theological productions, the fruit of his last years. After his death, which took place in 1810, some of them were collected by the Cavalier Onofrio Boni in the Opere Postume (Florence, 1817, two vols. 4to). Inghirami published in 1824 a new edition, with corrections and additions, of Lanzi's Notizie della Scultura degli Antichi, with engravings.

LAOCOON, a priest of Poseidon (according to some, of Apollo), at Troy. After the pretended retreat of the Greeks, he was sacrificing a bull to Poseidon on the shore, when two enormous serpents appeared swimming from the Island of Tenedos, and advanced towards the altar. The people fled, but Laocoon and his sons fell victims to the monsters. The sons were first attacked, and then the father, who attempted to defend them. Winding themselves round him, the serpents raised their heads high above him, while in his agony he endeavoured to extricate himself from their folds. They then hastened to the Temple of Pallas Athēnē, where, placing themselves at the foot of the goddess, they hid themselves under her shield. The people saw in this omen Laocoon's punishment for his impiety in having pierced with his spear the wooden horse which was consecrated to

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Athānē. The story has frequently furnished a subject to the poets, but it is chiefly interesting to us as having given occasion to one of the finest works of sculpture—the Laocoon Group, now in the Vatican. This was discovered in 1506 by some persons digging in a vineyard on the site of the baths of Titus. Pope Julius II. bought it for an annual pension, and placed it in the Belvedere in the Vatican. The preservation is perfect, except that the right arm of Laocoon was wanting: this was restored by a skilful pupil of Michael Angelo. This group is so perfect a work, so grand, so instructive for the student of the fine arts, that many authors of all nations, particularly Germans, have written on it, of whom we may mention Goethe, Heyne, Lessing, Winckelmann, and Herder. It represents three persons in agony, but in different attitudes of struggling or fear, according to their ages, and the mental anguish of the father. All connoisseurs declare the group perfect, the product of the most thorough knowledge of anatomy, of character, and of ideal perfection. According to Pliny it was the common opinion that this group was made of one stone by the sculptors Agesander, Polydorus, and Athenodorus, all three natives of Rhodes, and the two latter probably sons of the former. Doubts exist respecting the era of this work. Maffei places it in the eighty-eighth Olympiad, or the first years of the Peloponnesian war; Winckelmann in the time of Lysippus and Alexander; Lessing makes it probable that those three artists lived under the first emperors. It may be fairly doubted whether the statue mentioned by Pliny is the same which we now have; at least acute observers have found that the group does not consist of one block, though the junctions are very carefully concealed. To this it may be answered that they were not perhaps perceptible in the time of Pliny. Several copies exist of this matchless production; one in bronze, from a model by Giacopo Tatti or Sanzovino, which was carried to France. Bacio Bandinelli made a copy which is in the Medici Gallery at Florence. Good casts of the group are to be found in all important collections of statuary.

LAODICEA, the ancient name of four places in Asia Minor.—1. Laodicea (*ad Lycum*), now called by the Turks *Eski Hissar* (Old Castle), an ancient ruined city, once the capital of Greater Phrygia, 120 miles E.S.E. of Smyrna, the site of one of the seven primitive Christian churches of Asia. Nothing but very extensive ruins of inferior architectural merit remain to point out the locality of this interesting city. They comprise three theatres, one of which is 450 feet in diameter; a stadium, a gymnasium, and an aqueduct, but the principal remains are the vast walls. 'Nothing,' says Mr. Hamilton, 'can exceed the melancholy appearance of the site of Laodicea, no picturesque features in the nature of the ground on which it stands relieve the dull uniformity of its undulating and barren hills.' —2. (*ad Mare*). See LATAKIA.—3. (*Combusta*), now Ladik, a city of Lycaonia, north of Iconium.—4. (*ad Libanum* or *Scaliosa*), an ancient city of Syria, founded by Seleucus Nicator, which stood to the north-east of Baalbec, in a plain watered by the Marsyas.

LAOMEDON, in fabulous history the son of Ilus, king of Troy, and the father of Priam. He built the walls of Troy, and was assisted by Apollo and Poseidon, whom Zeus had banished from heaven, and condemned to be subservient to the will of Laomedon for one year. When the walls were finished Laomedon refused to reward the labours of the gods; and soon after his territories were laid waste by the Poseidon, and his subjects were visited by a pestilence sent by Apollo. Sacrifices were offered to the offended divinities, but the calamities of the Trojans increased, and nothing could appease the gods, according to the words of the oracle, but the annual exposure to a sea-monster of a Trojan virgin. Whenever the monster appeared the marriageable maidens were assembled, and one was doomed to death by lot, for the good of her country. When this calamity had continued for five or six years the lot fell upon Hesionē, Laomedon's daughter. The king was unwilling to part with a daughter whom he loved with uncommon tenderness, but his refusal would irritate more strongly the wrath of the gods. In the midst of this fear and hesitation Heracles came and offered to deliver the Trojans from this public calamity if Laomedon would promise to reward him with a number of fine horses. The king consented; but when the monster was destroyed he refused to fulfil his engagements, upon which Heracles besieged Troy, and took it by force of arms. Laomedon was put to death after a reign of twenty-nine years; his daughter Hesionē was given in marriage to Telamon, one of the conqueror's attendants, and Priam was ransomed by the Trojans, and placed upon his father's throne.

LAON (ancient *Bibrax Suessionum*), a town in France, capital of the department Aisne, on an isolated height in a large and fertile plain, 74 miles north-east from Paris. It is surrounded by walls and ramparts, which afford a beautiful promenade, but is antiquated, and notwithstanding modern improvements still very poorly built. The principal edifices are a large cathedral with two square towers, the church of St. Martin, an unadorned structure of the twelfth century, the prefecture, once an extensive nunnery with 300 inmates, the Hôtel Dieu, the public library, the town-house, college, barracks, &c. The manufactures are nails, hats, common woollens, and worsted caps; and the trade is in these, and in corn and wine. Laon was the seat of a bishopric in 500 A.D., and was made the capital of his kingdom by Charles the Simple of France about 900. Bonaparte was defeated here in 1814. On the 9th September, 1870, it surrendered to the Germans without a blow being struck. Just as the capitulation was concluded, and before the French had cleared out of the citadel, an explosion took place in the powder magazine, killing fifty Germans and 360 Gardes Mobiles. It turned out on inquiry that the act was committed by a subaltern artillery officer, indignant at the quiet surrender of the place. Pop. (1881), 12,623.

LAOS, the name commonly given to a region (but belonging rather to the tribes inhabiting the region), the limits of which are very vague, but which is surrounded by Burmah, Siam, Anam, and China. The territory is divided into a number of independent principalities, tributary to Siam and Anam. The natural features are not well known. It is intersected north to south by various mountain ranges, between which are extensive alluvial plains watered by large rivers, the chief of which is the Mekon. The mountains are said to be rich in gold, silver, copper, iron, and other metals. The plains are covered with swamps and stagnant pools, arising from the frequent overflowings of the rivers, yet they are fertile, and yield excellent rice. The forests are extensive, and contain many magnificent trees, among which are the varnish-tree and the fan-palm, the former of which attains here the utmost perfection. The principal domestic animals are bullocks and horses. The wild animals include the royal tiger and the rhinoceros; deer also abound in the forests. The inhabitants manufacture silk and cotton stuffs for family use, and prepare lacquered wares. The silkworm is reared in the country, but the produce is coarse. Laos carries on a considerable traffic with Siam, Burmah, and China, exporting ivory, gold,

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silver, tin, lead, precious stones, lac, benzoin, silk, hides, sapan-wood, &c.; and receiving in return manufactured articles. Population unknown.

LAO-TZE, or LAO-TSEU, sometimes also called LAO-KIUN, a celebrated Chinese philosopher, founder or reformer of one of the most ancient and important religious sects of China, known as the Tao, or sect of reason. He was a contemporary, and in many respects the rival of Confucius, and was born about the year 600 B.C. What little is known about his life we owe to the historical annals of Se-ma-tsien, which appeared about the year 70 B.C. From this source we learn that he was historiographer and librarian of a king of the Chow dynasty, that he travelled to the western parts of China, where he may have become acquainted with the religion of Buddha, and that he acquired such renown that Confucius paid him a visit. The meeting does not seem to have been a very cordial one; as the ascetic Lao reproached his visitor with pride, vanity, and ostentation. According to the tradition of his sect Lao-tze was the incarnation of a shooting-star, was eighty years in his mother's womb, and was, and is, considered by his followers as a sort of God. On the decline of the Chow dynasty he quitted the court, determined to live in solitude beyond the limits of the country, but was stopped by one of the military guardians of the frontiers, who wished the philosopher to compose a book for his instruction and guidance. Lao complied, and the result was the Tao-ti-king (Book of the Path or Celestial Reason and Virtue). On completing this task he mounted on a black buffalo, rode into the wilderness, and was never more seen of men. According to some of his disciples he ascended to heaven on the buffalo about the year 523 B.C. Nothing could be more widely opposed than the doctrines of Confucius and those of Lao-tze. The former taught obedience to all authority temporal and spiritual, respect for social observances, and fully recognized the benefits of advancing civilization. The latter, on the other hand, despised society and civilization; looked upon glory as a dangerous vanity, on wealth as a chain which bound man to earth. Labour he looked upon as an unmitigated evil, ignorance as a blessing, and retirement from the world as the highest form of human life. Up till his time the national worship had been confined to the *Shangte* (Supreme Ruler of the World) and the *Teen* (Heaven). For these Lao-tze substituted the Tao (the Path or Reason of the cosmos), appealing to abstract principles, instead of the precedents of ancient kings and sages, as did the followers of Confucius. The first part of the Tao-ti-king is taken up with an examination of first causes. Silence and the void produced the Tao, the source of all action and being. Man is composed of two principles, the one material and perishable, the other spiritual and unperishable, from which he emanated, and to which he will return on the subjugation of all the material passions and the pleasures of the senses. His moral code is pure, inculcating charity, benevolence, virtue, and the free-will, moral agency, and responsibility of man. Many corruptions were, however, introduced at subsequent periods by his followers. They gave out that they had discovered the draught of immortality by means of which the initiated were supposed to become ethereal, and pass into heaven without tasting death. Alchemy, divination, the invocation of spirits and prophecy, became the principal pursuits of the sect. Monasteries and nunneries were founded and flourished. Since the second century of our era the sect has continued to extend over China, Japan, Cochin-China, Tonquin, and the Indo-Chinese nations. The Tao-ti-king has been translated into French by Stanislas Julien (Paris, 1842).

LA PÉROUSE, JEAN FRANÇOIS GALAUP, COMTE DE, a French navigator, distinguished for his talents, and still more remarkable for the mystery attending his fate. He was born at Albi, in Languedoc, in 1741, and entered at an early age into the naval service of his country. During the American war he had the command of an expedition sent to Hudson's Bay, when he destroyed the trading establishments of the British. After the restoration of peace, the French government having determined on the prosecution of a voyage of discovery, M. de la Pérouse was fixed on to conduct the undertaking. Two vessels—the *Boussole* and the *Astrolabe*—were placed under his command; and leaving France in 1785, he proceeded to the South Sea, and having visited the coast of California and other places farther north, he crossed the Pacific, to continue his researches on the eastern coasts and islands of Asia. In April, 1787, the ships sailed from Manilla towards the north; and after passing the islands of Formosa, Quelpaert, the coasts of Corea and Japan, they sailed between Chinese Tartary and Saghalien without being able to determine whether it was an island or a peninsula; returning south, they discovered the straits which bear the name of La Pérouse, and sailing north on the eastern coast of Saghalien, at length, September 6, arrived at the harbour of Petropaulovsk, on the coast of Kamtchatka. There they stayed to refit the ships, and experienced the utmost hospitality from the Russian local authorities. From Petropaulovsk La Pérouse sent copies of his journals, &c., to France, by M. de Lesseps, who proceeded overland across Siberia to St. Petersburg. From these papers was drawn up the relation of his voyage, published at Paris (1797, four volumes 4to), an English translation of which appeared in 1798 (three volumes, 8vo). September 30 the vessels sailed in search of farther discoveries. They crossed the equinoctial line without meeting with any land till December 6, when they saw the Navigator's Islands, and a few days after they landed at Maouna, one of that group. Here M. de Langle, the captain of the *Astrolabe*, M. Lamanon, the naturalist attached to the expedition, and ten other persons, were killed in what appears to have been an unprovoked attack of the natives. After this misfortune La Pérouse visited Oyolava, an island near Maouna, and then steered for the English colony in New South Wales. January 23, 1788, they made the coast of New Holland, and on the 26th anchored in Botany Bay. They left Botany Bay in March, and in a letter which the commodore wrote February 7, he stated his intention to continue his researches till December, when he expected, after visiting the Friendly Islands, to arrive at the Isle of France. This was the latest intelligence received of the fate of the expedition; and M. d'Entrecastaux, who was despatched by the French government in 1791 in search of La Pérouse, was unable to trace the course he had taken, or gain any clue to the catastrophe which had befallen him and his companions. In 1825 the attention of the public was excited towards this mysterious affair by a notice published by the French minister of the marine, purporting that an American captain had declared that he had seen, in the hands of one of the natives of an island in the tract between Louisiade and New Caledonia, a cross of the order of St. Louis, and some medals, which appeared to have been procured from the shipwreck of La Pérouse. In consequence of this information the commander of a vessel which sailed from Toulon in April, 1826, on a voyage of discovery, received orders to make researches in the quarter specified, in order to restore to their country any of the shipwrecked crew who might yet remain in existence. Other in-

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telligence, relative to the wreck of two large vessels on two different islands of the New Hebrides, was obtained by Captain Dillon, the commander of an English vessel at Tucopia, in his passage from Valparaiso to Pondicherry in May, 1826, in consequence of which he was sent back to ascertain the truth of the matter. The facts discovered by him on this mission were that the two ships struck on a reef at Mallicolo, 11° 4′ S. lat.; 169° 20′ E. lon.; one of them immediately went down, and all on board perished; some of the crew of the other escaped, part of whom were murdered; the remainder built a small vessel, and set sail from Mallicolo, but what became of them is not known. The truth of Dillon's statements was afterwards ascertained by Dumont d'Urville.

LAPIDARY, in the preparation of gems for sculpture, an artificer who cuts precious stones. This art is of great antiquity. There are various machines employed in the cutting of precious stones, according to their quality. The diamond, which is extremely hard, is cut in a wheel of soft steel turned by a mill, with diamond dust, tempered with olive-oil, which also serves to polish it. Oriental rubies, sapphires, and topazes are cut with diamond dust and olive-oil on a copper wheel. Emeralds, amethysts, agates, garnets, and other soft stones are cut with emery powder and water on a lead wheel.

LAPIS LAZULI. This superb mineral, which usually occurs massive, is also found crystallized in dodecahedra belonging to the regular system. It is of a rich azure-blue colour; lustre vitreous; fracture uneven; scratches glass; opaque; easily broken; specific gravity, 2·45. In a strong heat it intumesces, and melts into a colourless mass. Its composition is variable, consisting of 43–49 silica, 11–43 alumina, 1–23·5 lime, 1–4 peroxide of iron, 8–11·5 soda, 2–6 sulphuric acid, 2 water. It also contains small quantities of chlorine, carbonic acid, and 3–4 per cent. of sulphur, which seems to be present in the form of a sulphide. It is readily acted on by hydrochloric acid, gelatinous silica separating, and sulphuretted hydrogen being evolved. It is unknown to what it owes its blue colour, as none of its constituents, and none of the compounds which these would form with each other, have a blue colour. It is noticeable, however, that colourless lapis lazuli also occurs. The finest specimens are brought from China, Persia, and Great Bucharia. It is much esteemed for ornamental purposes, especially for inlaid work. The most splendid exhibition of this rare substance is made in the celebrated marble palace built by Catharine, at St. Petersburg, for her favourite Orlof, in which, according to Patrin, there are entire apartments inlaid with lapis lazuli. The ancients, who called it *sapphiros*, were in the habit of engraving upon it, and several specimens of their works are to be seen in the National Library at Paris. Its chief value consists in its affording the very precious pigment called *ultramarine* (which see).

LAPITHÆ, a people of Thessaly, said to have been descended from Lapithes, a son of Apollo and Stilbe, and the brother of Centaurus. They were governed by Pirithous, a son of Ixion, and half-brother of the Centaurs. The latter were invited to the nuptials of Pirithous, and a violent quarrel broke out during the festivities between the Lapithæ and the Centaurs. Many of the Centaurs were slain, and they at last were obliged to retire. Hesiod (Shield of Heracles) and Ovid (Metamorphoses xii.) have described the battle of the Centaurs and Lapithæ.

LAPLACE, Pierre Simon, Marquis de, a celebrated mathematician and astronomer, was born at Beaumont-en-Auge, in the department of Calvados, in March, 1749. The circumstances of his parents were extremely humble, and he was indebted for the means of acquiring his early instruction to the generosity of some rich individuals to whom his uncommon talents and astonishing aptitude for mathematical studies had accidentally become known. The expectations which had been formed of him were quickly realized by the great rapidity of his progress, which was such that at a very early age he was appointed a professor of mathematics in the military school of his native town. This field, however, soon appeared too confined for his aspiring views, and he abandoned it in a short time in order to prosecute his studies with greater advantages, and seek his fortune in Paris. In the capital the brilliant talents of the young geometer soon procured him protectors; among others d'Alembert, who admitted him to his friendship, and in some measure directed his first steps in the career of the sciences. Laplace profited so well by the counsels and lessons of this illustrious master that in a short time he signalized himself by the capital discovery of the invariability of the mean distances of the planets from the sun, and by the establishment of some theories of great importance in analysis. His first essays were made under the auspices of the President Saron, to whom he dedicated his works, and who defrayed the expense of their publication. Through this patronage he was appointed to succeed Bezout in the situation of examiner of the royal corps of artillery; an office which left him sufficient leisure to prosecute the studies which he had commenced with such distinguished success. At the early age of twenty-four he was admitted into the Academy of Sciences, and from this time devoted himself with ardour to the composition of a series of memoirs on the most important questions of physical astronomy, and to the development in all their details of the consequences that result from the general laws which regulate the system of the universe. Besides these and other researches connected with the improvement and extension of mathematical science, his attention was turned successfully to the investigation of the principles of, and to experimental researches in, chemistry; and, associated with Lavoisier, he was the first to repeat in France the experiments of Cavendish to effect the decomposition of water. During the revolution Laplace was several times in danger of meeting a premature fate. He was not one of those retiring unobtrusive sons of genius who gladly relinquish the objects of political ambition for the calm pursuits of philosophy; on the contrary, he entered into all the frenzies of that distracted period with the same enthusiasm which he displayed in his other occupations; and the extravagant and even ridiculous excess to which he carried his professions in favour of liberty, equality, and republicanism, especially when contrasted with the suppleness and subserviency of his subsequent political conduct, greatly diminished the respect which would have been willingly yielded to his profound genius and distinguished services in the cause of science. At the establishment of the Polytechnic School he was appointed one of the professors in that admirably conceived institution. In 1796 he did homage to the Council of Five Hundred by presenting to them his Exposition du Système de Monde, a work which was received by the scientific world in general with unbounded admiration. In 1799 he was nominated by the consuls to the ministry of the interior. His success as a minister of state was by no means commensurate with his high reputation as a mathematician, and after six weeks he was superseded. Bonaparte, who himself aspired to the renown of science, and who always manifested the most friendly dispositions towards Laplace, said of him, in reference to the

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inaptitude which he displayed in the management of practical matters, that he never seized any question in its true point of view, that he sought for subtleties in everything, that his ideas were problematical, and that, in short, he carried into the administration the spirit of the infinitesimal calculus. The same year he was called to a place in the senate, of which body he was subsequently vice-chancellor and president. In 1806 he was raised to the dignity of count of the empire. But although he was indebted for all these offices and honours to the personal favour of Bonaparte, yet, on the emperor's reverse of fortune in 1814, he was one of the first to push matters to extremity against his ancient benefactor, and to vote for the overthrow of the imperial power and the establishment of a provisional government. On the re-establishment of the Bourbons the facility with which he had deserted his former master and his zeal in the service of the restored dynasty were rewarded with the title of marquis, and a seat in the chamber of peers. In 1816 Laplace was named a member of the French Academy, an honour to which he was eminently entitled by the admirable clearness, and purity, and elegance of his style. He died in March, 1827. It is difficult for a student who has perused the writings of Laplace to know how much merit belongs to this great astronomer for original research in consequence of his almost total neglect to acknowledge his indebtedness to his predecessors or contemporaries. The name of his illustrious friend Lagrange is rarely mentioned, and one of the latter's finest analytical discoveries is referred to merely as 'formula No. xxi. of the second book of the Mécanique Céleste' (Laplace's own work). In like manner he gravely informs his readers, 'We will now give several general theorems, which will be useful as we proceed,' these general theorems being known over the whole scientific world by the names of Maclaurin, Taylor, &c. On the other hand we find him referring to himself in almost every page. The student is then apt to fancy that after more extensive reading he shall find himself obliged to restore more and more to the right owner, until nothing is left to justify such a reputation as that of Laplace. After all due restoration has been made, however, almost any one of his original researches, contained in his great work the Mécanique Céleste and the general method of the Théorie des Probabilités for the approximation to the values of definite integrals, are alone sufficient to stamp him as one of the greatest of mathematicians. His discovery of the cause of the discrepancy between the theoretical and observed velocity of sound, his rules for barometrical measurement, his theories regarding capillary attraction, tides, atmospheric refraction, the static properties of electricity, molecular actions, the properties of gases, &c., prove that in some of the most important departments of physics his mind was not less profitably and actively engaged than in mathematical analysis. Astronomy owes to his labours the discovery of the invariability of the major axes of the planetary orbits, and of the great inequality in the motions of Jupiter and Saturn; the solution of the problem of the acceleration of the mean motion of the moon, the theory of Jupiter's satellites, and other important laws. The most important of his works are the Mécanique Céleste, already mentioned (five vols. 4to, with four supplements, 1799–1825); Système du Monde (two vols. 1796), a *resumé* of all modern astronomy, unsurpassed for perspicuity and elegance in any scientific language; Théorie analytique des Probabilités (1812–20); Essai sur les Probabilités (1814). His contributions to the memoirs of the Institut on various isolated points of science are numerous and valuable.

LAPLAND (native name *Sameanda;* Swedish, *Lappmark*), an extensive territory in the north of Europe, stretching between lat. 64° and 71° N., and from the shores of Norway east to those of the White Sea; area about 130,000 square miles, of which more than a half, situated east of the Torneå and its tributary, Muonio, belongs to Russia; and the remainder is shared, in nearly equal proportions, between Sweden and Norway. As Lapland is not the name of any great political division a particular description of its different portions must be looked for under the names of the states to which they belong; and it may therefore be sufficient here to observe in general, that, both from geographical position and physical conformation, Lapland is one of the most forbidding regions of the globe, consisting either of rugged mountains, some of them covered with perpetual snow, and many of them only for a short period free from it, or of vast monotonous tracts of moorland wastes. This extensive territory appears to have been at one time wholly occupied by the people to whom it owes its name; but its southern and better portions have been gradually encroached upon by Norwegians, Swedes, and Finlanders, till the Laplanders proper have in a great measure been cooped up within the Arctic circle. There they retain their distinctive features and ancient customs, and find ample scope to follow their favourite modes of life, either as Fjelde-Finner, Mountain Laplanders, leading a nomadic life, and pasturing large reindeer herds; or Söe-Finner, Sea or Shore Laplanders, who, too poor to possess such herds, have been obliged to fix their residence upon the coast, and subsist chiefly by fishing. The origin of the Laplanders as a race has greatly puzzled ethnologists, in consequence of their presenting a combination of physical properties not possessed exclusively either by the Mongolian or the Caucasian stock, but belonging partly to the one and partly to the other. Their chief characteristics are—low stature, seldom exceeding five feet in height; great muscular power; a large head; dark, long, and glossy hair; dark eyes, opening of the eyelids long and narrow; high cheek-bones; nose low and broad; wide mouth; a scanty beard; and a skin of a yellow, dingy hue, probably rendered deeper than nature has made it from uncleanliness. Their dress, at least that of the Mountain Laplander, is composed almost throughout of reindeer-skin. In summer the reindeer-skin is often exchanged for a woollen coat. The Laplanders are simple-hearted, hospitable, and inclined, as far as their knowledge goes, to practise the duties of Christianity, which they all profess, under the form of Lutheranism in Norway and Sweden, and that of the Greek Church in Russia. They are excessively fond of ardent spirits and tobacco. The number of Laplanders is not supposed to exceed 27,000 of all descriptions. Probably one-third of them are nomadic.

LA PORTE, a city of the United States, capital of La Porte county, Indiana, is situated at the intersection of three railways, 60 miles south-east of Chicago. It contains a court-house, about twenty churches, a Catholic academy, several schools, &c. Being the centre of a fertile agricultural district, and having ample means of communication, it carries on a considerable trade in farm produce. It has iron-foundries, manufactories of agricultural implements, carriages, and woollen goods. The neighbourhood has become a favourite resort of summer visitors on account of its beautiful lakes, from which, in winter, ice is collected and sent to Chicago and elsewhere. Pop. (1880), 6195.

LAPPENBERG, JOHANN MARTIN, a German historian, was born in Hamburg, 30th July, 1794. His father, a physician of some note, sent him to Edinburgh to study medicine, but he soon turned by

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inclination to history and political science. After visiting the Highlands and the Hebrides he went to London, where he spent some time in studying the English government and constitution. He continued his historical and legal studies at Berlin, and received his doctor's degree in 1816. He was sent by the Hamburg senate during the Congress of Troppau as minister resident to the Prussian court, and remained in Berlin till 1823, when he was appointed archivist of his native town. This post, which furnished him with the best opportunity and means of pursuing his historical researches, he held until his death. He discovered many valuable memoirs which were supposed to have been lost, among which were the records of the old cathedral of Hamburg. In 1848 he became a member of the senate of that town, and in 1850 took part as plenipotentiary in the negotiations at Frankfort which ended with the pacification of Germany. He died 28th November, 1865. His most remarkable work, both in respect of style and erudition, is his Geschichte von England (two vols. Hamburg, 1834–37). It was translated by Benjamin Thorpe under the title of History of England under the Anglo-Saxon and Norman Kings (1845–57). Lappenberg was prevented by the partial loss of his eyesight from continuing the work to the Reformation, but this task was undertaken by Dr. Pauli, a worthy successor. Lappenberg was author of various learned works on the history and constitution of the Hanseatic League, and the history and antiquities of Hamburg and Heligoland; he edited an edition of Murner's Till Eulenspiegel, and a collection of Klopstock's Letters. He also made valuable contributions to the Monumenta of Pertz, and to Ersch and Gruber's Encyclopædia.

LAPSE, in ecclesiastical law, a slip or omission of a patron to present a clerk to a benefice within six calendar months of its being void; in which case the benefice is said to be in *lapse*, or *lapsed*, and the right of presentation devolves to the ordinary.

LAPSED LEGACY is where the legatee dies before the testator, or where a legacy is given upon a future contingency, and the legatee dies before the contingency happens. Where it is not otherwise directed in the settlement, the lapsed legacy falls into and becomes part of the residue of the estate.

LAPWING (*Vanellus*), a genus of birds belonging to the order of Grallatores or Waders, and included in the Pressirostral ('compressed bills') section of the order. The bill is of moderate length, and is compressed or blunted at the point. The legs are elongated, the toes being slender and short, and connected at their bases by a web. The hinder toe is short, and may be rudimentary. The tarsi are scaly. The lapwings inhabit marshy districts, and may occasionally be found on the sea-beach. The common species is about the size of a pigeon. These birds are found in large flocks, but appear to separate and pair during the breeding season. The wings are long, and the flight powerful; whilst they run and wade with equal facility. The eggs are of a dirty olive colour, spotted with black; and four are generally found in each nest, which consists simply of a little dry grass roughly drawn together. The young run about very soon after they are hatched, and are carefully tended by the old birds, who divert any one from the nest by fluttering around him; or if he persists in advancing, they then endeavour to distract his attention by imitating lameness, thus inviting pursuit. Their mode of catching worms is of a highly ingenious kind. They seek for the little mounds which mark the entrance to the worm-burrows, and after opening it with their bill they tap the ground at the side. The worms are thus attracted to the surface, when they become the prey of the ingenious hunter. The lapwings are exceedingly lively and nimble in their movements, and in all their motions appear to be endowed with great instinctive powers. They are hunted for the sake of their flesh, which is highly esteemed, as also are their eggs, which fetch good prices in the London markets. The month of October is considered the season when the lapwings are in highest flavour, and at this period of the year they are shot in large quantities, particularly in the fen districts of England. The Common or Crested Lapwing or Peewit (*V. cristatus*) is widely distributed in Europe and Asia. (Pl. CXLVIII.–CXLIX. fig. 15.)

LAQUERING. See LACQUERING.

LARBOARD, a name formerly given by seamen to the left side of a ship, when the spectator's face is turned in the direction of the bow. The resemblance of the two sounds, larboard and starboard, caused so many mistakes, that by order of the admiralty the use of the former term was abandoned, and *port* substituted.

LARCENY is the fraudulent taking by a person of the goods of another, without his consent, with the intent, on the part of the taker, to appropriate them to his own use. As to the taking, the mere removing of the goods is sufficient to constitute the crime; as, where the thief took down goods and put them into a parcel, for the purpose of carrying them away, but was detected and arrested before carrying them away, this was held to be a sufficient taking to constitute larceny. But where a person only changed the position of a package of cloth, by raising it on end, for the purpose of taking out [illegible] cloth from the bale, and was detected in his purpose before he had opened the bale, this was held not to be a sufficient taking to amount to this offence. The doctrine in this respect is, that to make the crime of larceny the person committing it must get the article into his possession. The intent is a material circumstance; for if goods be taken by negligence or mistake it is not larceny; as if sheep stray into one's flock, and he shears them by mistake, as his own. The necessity of an intention to steal, in order to constitute larceny, is illustrated by the case of a servant's assisting some thieves to steal his master's goods, with the consent of his master, merely that the thieves, who had previously formed the design of committing the theft, might be detected: it was held not larceny on the part of the servant, but it was held to be so on the part of the others; though it was objected, on their behalf, that the taking was not against the consent of the master, it being essential to larceny that it should be committed against the owner's consent; but the court held it to come under this description of crime, for the thieves had previously formed the design of stealing the goods, and the master did not consent to their appropriating them to their own use, but only to their proceeding so far that they might be detected and convicted of the crime.

If a person has property in goods, and a right to the possession of them, he cannot, in general, commit the crime of larceny in taking them; but if he only has the custody of them, and no property in them, he may steal them. Thus, if a bailee or lessee of chattels appropriates them to his own use, it is not, in general, larceny. Yet it has been held that, when a common carrier, having charge of a package or box of goods, opens it and takes out a part of the goods, with the intent to steal them, this is theft. But the common law makes a very subtle distinction in this respect, for though breaking the package, and taking a part, with the design of appropriating the articles, is theft, yet selling the whole package entire has been held not to be so, but only the violation of a trust. The cases where a chattel is taken by a person to whom it has been intrusted, and who converts

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it to his own use, present very nice discriminations of larceny from mere breaches of trust, in regard to which the distinction is made by various circumstances. If the person gets possession of the goods under a false pretence, with the design of stealing them, yet if they come into his possession on a contract, or trust, it has been held, in many cases, not to be a larceny; as, where a horse was bargained for at a fair, and the purchaser rode him off, saying he would return directly and pay the purchase money, but did not come back at all, having intended to swindle the vendor, it was held not to be theft. If, however, the purpose for which the article was intrusted to another is accomplished, and he afterwards converts it to his own use, with the intention of stealing it, this is larceny; as where a horse was let to go to a certain place and back, and the hirer, having gone and returned, then sold the horse, it was held to be theft, for the particular purpose for which the horse had been intrusted to him had been served. And the courts generally lean towards construing the offence to be a larceny, and not merely a trespass, where the party gains possession by some false pretence, with the original intent to steal; and with good reason, since it is adding a breach of trust to the crime of larceny. If the owner does not part with the possession of the goods, though the person intending to steal them contrives to bring them within his reach by some false pretence, this raises no doubt of its being a larceny; as where one sent to a hosier's for a quantity of stockings, under pretence of wishing to purchase some, and having selected a part out of a parcel brought by a servant, which he pretended he was going to purchase, under some pretence, sent the servant away, and then decamped with the whole parcel, it was held to be larceny, for the owner had never intrusted him with the parcel, or consented to part with the possession. The same construction was put upon the case when a servant was sent with some goods to a certain person, and another, pretending to be the person to whom they were sent, received them with the intent of stealing them. The cases of ring-dropping are instances of it; such getting possession of money or goods by false pretences, being held to be larceny, though the goods come into the possession of the thief by consent of the owner; that is, when a person, in company with another, pretends to find a ring, which was previously dropped for the purpose, and the companion, being imposed upon, proposes to share in the good fortune, to which the finder consents; but not having money, proposes to his companion to take the ring, giving cash, a watch, or something of half the supposed value of the ring, as a pledge until he can dispose of the ring, when its value is to be equally divided. The transfer having been made, the swindler goes off with the article that he has received, and his companion finds the ring is of little value. This is held to be larceny.

As to the kinds of things the taking of which is larceny, they must, according to the common law, be personal property, it being a maxim that, though real estate may be trespassed upon, it cannot be stolen; and so fixtures, and whatever is a part of the reality, as it is called, could not be subjects of larceny. Thus it was held that a standing tree, fruit upon the tree, ore in a mine, a fence, lead, brass, or other metal, attached to a building, a copper boiler set in bricks, and whatever else would pass by a conveyance of an estate, was not a subject of larceny, and the taking of such things was only a trespass on the real estate. But this distinction is mostly abolished by statutes, for which there was the stronger reason, as many of these things were such as were peculiarly exposed to be stolen. So again, by the common law, the feloniously taking of written instruments, they not being considered as property, but merely as evidence of contracts, was held not to be larceny; but this doctrine has been partially abrogated by statutes, and the felonious taking of bonds, bills of exchange, &c., is larceny. As to animals, birds, &c., the felonious taking of domesticated ones is felony; but it is not so with those esteemed to be of a wild nature, as deer in an open forest or chase, hares, rabbits in a warren, foxes, &c., although they may belong to, or have been purchased by some individual, unless they are tamed, or are in the possession and under the control of some one. The felonious taking of a hive of bees is held to be larceny, unless it be a wild hive in the forest, the taking of which is held not to be larceny. Nothing can be stolen which is not a subject of property; but the crime of larceny is not confined to the depriving the owner of the possession of the article. It is sufficient to constitute the offence, to take the article from the possession of one having only a special property, as a carrier or other bailee; and it is a sufficient allegation of the ownership, in the indictment, to state that the article belonged to such person having a special property. In regard to shrouds and coffins of lead, or other materials of value, the question of ownership has heretofore been made, and they are held to belong to the heirs, executors, or legatees of the person deceased, and it may be so alleged in the indictment.

Larceny was formerly divided in England into two kinds, grand and petty; the former being the stealing of an article over the value of one shilling; the latter, that of an article not over that value. But this distinction was abolished by a statute of 7 and 8 Geo. IV., though it still obtains in a modified character in some of the states of the American Union. In England the punishment for grand larceny was at one time death; but most frequently in later times it was commuted for transportation; and now the punishment of all simple larceny, of whatever value, is imprisonment or penal servitude. Some species of larceny, as from the person, are more severely punished than others by the English and American law; and a larceny committed in a dwelling-house, by night, is generally considered an aggravated crime, and is punished accordingly. A severer punishment is awarded on a second or third conviction of the same offender.

LARCH (*Larix*, natural order Coniferæ; suborder Abietineæ), a genus of deciduous trees, some of them of large dimensions, natives of the mountainous regions of Europe, the west of Asia, and of North America. The European larch, in favourable situations on the Alps, and also in Britain, grows to a height of from 80 to 100 feet, with a trunk of 3 feet to 4 feet in diameter. The branches are subverticillate, and spreading horizontally from the straight trunk; occasionally, however, rather pendulous; the leaves are linear, soft, blunt, or rounded at the points; of a light-green colour; single or fasculated, in the latter case many together round a central bud; spreading and slightly recurved. The cones are oblong-ovate, erect, 1 inch in length, and of a brownish colour when ripe. The wood is compact, of a reddish or brown tinge, and on favourable soils is considered to be fit for every useful purpose in 40 years' growth. The greatest drawback of the wood is its liability to warp. The article of commerce named Venice turpentine, is obtained from this tree. The oldest larches in Scotland are those at Dalwick, near Peebles; they were planted in 1725. The larches at Dunkeld were planted in 1727. The American larch, or hackmatack, is a slender tree, with heavy cross-grained wood, horizontal branches, and shorter leaves than the European species. It is a native of Canada, the northern parts of the United States, and the higher parts of the Alleghanies.

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LARD is the melted and strained fat of swine, which differs in its situation from that of almost every other quadruped, as it covers the animal all over, and forms a thick, distinct, and continued layer betwixt the flesh and the skin, somewhat like the blubber in whales. The greater part of the finer sorts of the lard of commerce is procured from the abdominal part of the animal. The usual mode of preparation is, to wash it thoroughly in a stream of water, to melt it in a jar placed in a kettle of water, to strain it and run it into bladders that have been cleaned with great care. The smaller the bladders are the better the lard will keep. The intestinal fat differs from common lard, and is preferable for the greasing of carriage wheels. Lard is rather soft, white, and readily fusible at 100° Fahr. It consists of stearine, which is a solid, and oleine, which is a liquid fat; but it usually contains small quantities of impurities, and it is to them probably that it owes its becoming occasionally rancid. It is largely used for culinary purposes, in perfumery for pomades, in currying, and in pharmacy for the making of ointments. When subjected to pressure the oleine is liberated, forming lard-oil. It is used as a lubricant, but it is sometimes mixed with oils of better quality as an adulterant. Large quantities of lard come from the Continent, but the chief supply is from North America, from which 32,171 tons were brought in 1882, the value being about £1,848,465. Benzoated lard is made by heating in a water-bath, with occasional stirring, a mixture of purified lard and gum benzoin, then straining and stirring till cold. It keeps very well, has a pleasant odour, and is used for certain ointments.

LARDARELLITE, named after Count Lardarello, who devised the method of getting boracic acid from the Tuscany lagoons (see BORACIC ACID), is native borate of ammonium. It is a light, white, tasteless salt, which forms minute tabular crystals. It dissolves very readily in water, and is met with only in Tuscany in the water vapours of the Soffioni.

LARDNER, DIONYSIUS, an able and popular writer on scientific subjects, born in Dublin in 1793, was employed for a short time with his father, who was a solicitor, and then entered Trinity College, where he devoted himself especially to mathematics and the sciences dependent upon it. The distinction which he acquired in these pursuits procured him ample employment as a contributor to the leading encyclopædias then in course of publication, and also led to his appointment in 1827 to the chair of natural philosophy and astronomy in the newly erected University of London. Not long after this appointment he suggested and became editor of the Cyclopædia which bears his name, and had attained a high rank, both as a man of science and as a writer, surpassed by few in the art of making scientific subjects interesting to general readers, when he shocked his friends and the public by seducing a married lady, the mother of several children. The public scorn, as well as damages to the amount of £8000 awarded against him, in an action at the instance of the injured husband, made it necessary for him to withdraw to the United States. He married the lady on the death of her husband. On his return to Europe in 1845 he fixed his residence at Paris; but published several works in London, one of which, entitled The Museum of Science and Art, has had a very extensive circulation. He died on the 29th April, 1859, aged sixty-six.

LARDNER, NATHANIEL, a learned divine, born 1684, at Hawkhurst in Kent. At the age of sixteen he was sent to the University of Utrecht, and afterwards to that of Leyden. He returned to England in 1703, and commenced a preacher about the age of twenty-five. In 1713 he went to reside in the family of Lady Treby as domestic chaplain, and tutor to her son, whom he afterwards accompanied on a tour through part of France and the Netherlands. In 1723 he was engaged in conjunction with other ministers in carrying on a course of lectures at the Old Jewry, London. In 1727 he published in two vols. 8vo, the first part of the Credibility of the Gospel History; the twelfth part appeared in 1755, and was followed by three supplementary vols., comprising a History of the Apostles and Evangelists, with Observations on the New Testament. The University of Aberdeen in 1745 conferred on him the degree of D.D. In the latter part of his life he retired to Hawkhurst, where he died July 24, 1768. Besides his principal work he was the author of Jewish and Heathen Testimonies to the Truth of the Christian Religion (1764–67, four vols. 4to); the History of the Heretics of the two first Centuries (4to, 1780); a Vindication of three of our Saviour's Miracles, and other theological compositions. A collective edition of his works, with his life by Dr. Kippis, was published in 1788 (eleven vols. 8vo). A later edition in ten vols. was published in 1828.

LARES, a class of tutelary spirits or deities (domestic and public) among the ancient Romans. Their worship was closely connected with that of the Manes, but only the spirits of good men were honoured as lares. All the household lares were headed by the *lar familiaris*, who was revered as the founder of the family, and when the latter changed their residence he accompanied them. In the mansions of the rich the images of the lares had their separate apartment, the *lararium;* in the dwellings of the lower classes they generally stood upon the hearth in a kind of shrine. When the family took their meals some portion was offered to the lares, and on festive occasions they were adorned with wreaths. The worship of the public lares is supposed to have been introduced from the Etruscans by Servius Tullius, and was renewed by Augustus. They had a temple in the Via Sacra, and were revered as the protecting spirits of the city. There were others who were regarded as presiding over the different classes of men and places, as highways, rural districts, the sea, &c.

LARGO, an Italian word, used by musicians as a direction for the time or style in which a piece of music is to be performed. It is generally understood to mean *slow*, but it rather indicates a broad expressive style. *Larghetto* is the diminutive of *largo*.

LARGS, a small port, and much-frequented seabathing town, Scotland, in the county of Ayr, on the east shore of the Firth of Clyde, 22 miles W.S.W. of Glasgow. It has many handsome villas, pretty cottages, and a few fine family seats. There are several churches of various denominations, schools, a library and reading-room, and baths. Yacht-building, for which the neighbourhood is famous, is the staple industry. There is daily communication by steamers with Glasgow, &c.; the harbour is small, and chiefly frequented by herring-boats and other small craft. In 1263 Alexander III. defeated the Norwegians under Haco in the vicinity. Pop. (police burgh), 3076.

LARISSA (the modern *Yenitcher*), a city of Thessaly, on the Peneus (now called the *Selembria*), celebrated in ancient times for its bull-fights. It was the rendezvous place of Julius Cæsar's army before the battle of Pharsalia. It is now the largest, richest, and most populous city in Thessaly, and the seat of a Greek archbishopric, with a population estimated at 20,000, of whom about one-fourth are Greeks. It has houses for dyeing yarn, manufactories of morocco leather, and a considerable trade.

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LARK (*Alauda*). This genus of well-known Insessorial birds (see INSESSORES) is included in the family Fringillidæ, which group forms one of the divisions of the Conirostres, or 'Conical-beaked' Perchers. The *Alaudinæ* are recognized by the straight, short, conical bill, which bends a little towards its extremity. The upper mandible is not notched or indented at its tip. The nostrils are covered with feathers, and the tongue is bifid or forked. The toes are free, and are arranged three forwards and one directed backwards, as in the great majority of Passerine birds; but the larks possess a highly distinctive character, in the great length and straightness of the nail or claw of the hind toe. The pipits or titlarks (*Anthus*), included in a different group from the true larks, also possess this elongated hinder nail. The tertiary feathers of the wing, or those borne by the upper arm, are greatly developed in the larks, and are as elongated as the primaries, or those attached to the bones of the hand, and which are ordinarily the longest feathers in the wing. The larks possess a very general distribution throughout the Old World; but only one species of true lark, the Shore-lark, is found in America. From the conformation of their toes these birds do not generally perch. They are thoroughly terrestrial in their habits, running along the ground, and feeding upon worms, insects, larvæ, and seeds. The nest is also built on the ground, and the eggs are from four to six in number, and are spotted. The general colour of the larks tends towards brown or gray, spotted with darker tints. The best known species is the Sky-lark or Field-lark (*Alauda arvensis*), familiar to all from its powers of singing, as well as its capability of domestication. The nest is constructed of grasses, and lies on the ground; it is most frequently found under the friendly shelter of a tuft of grass or earthy clod. The eggs number four or five; the period of incubation being about a fortnight, and two broods being produced in the year. The pairing-time is during the month of April. In early spring the sky-lark begins its song, which it continues throughout the summer, and far into the autumn. This bird is remarkable as being one of the few which sing freely whilst on the wing. It begins to sing when it rises from the ground to commence its morning flight; the hour of three in the morning being stated as the period when the lark generally ascends in summer. The notes, at first feeble and interrupted, swell out to their full tone as the songster ascends; and long after the bird has passed from the range of vision, the full notes of the melody are audible to the ear of the observer. The Crested Lark (*A. cristata*) is a common Continental species, very similar in size and colour to the sky-lark, with the addition of the crest. The largest European species is the Calandra Lark (*A. calandra*), which inhabits the south of Europe and the deserts of Asia. (See Pl. CXLII.-CXLIII. figs. 13, 14, 15.) These birds are snared during the autumn and winter time in large numbers, when they assemble in flocks for the purpose of feeding in hedges or among the stubble. Pennant states that as many as 4000 dozen have been caught near Dunstable alone.

The Wood-lark (*A. arborea*) is less common than the sky-lark, and is known by its smaller size and less distinct colours. It perches upon trees, and is found chiefly in fields near the borders of woods. Its flight is much less extensive and powerful than that of the sky-lark. The wood-lark sings during the night, and on this account has been mistaken for the nightingale, with which species it appears to entertain feelings of strong rivalry; for, when kept in a cage near one of the latter birds the Wood-lark strives so heartily to surpass the nightingale that it frequently falls a victim to its emulative efforts. The nest is generally built under bushes. The eggs are five in number, of a dusky colour, spotted with deep brown spots, and like the sky-lark the parent species raises two broods annually.

The Shore-lark (*A. alpestris*) is found in Europe, although it is much more common in America, where it alone represents the true larks. It has a northern range as far as Labrador and the shores of the Arctic Ocean, and breeds in these regions during summer. In winter it flies southwards, and is found at that season in Virginia and Carolina. It is of a reddish drab colour, tinted white beneath; a broad patch or dark colour exists on the breast and under each eye; the lateral tail-feathers being black. The nest is built upon a patch of lichen or moss, the colour of which is so closely imitated by the shore-lark that nest and inmate can only be discovered by close observation. And in this mimetic protection the bird is said so confidently to trust, that she will remain upon the nest until almost driven off by the observer's foot. Like the lapwing, the shore-lark is said to counterfeit lameness and to hop away in an opposite direction in order to distract an intruder from approaching the nest. Other two species are of British occurrence, but are rarely found. The Brown Lark of Wilson more properly belongs to the Pipits or Titlarks (*Anthus*). It resembles the true larks closely in its habits; singing on the wing, rarely perching on trees, building in the ground, &c. The brown lark occurs both in Europe and America. It is of a pale reddish-brown colour beneath, the breast being spotted with black. The tail-feathers are blackish, edged with white; the secondary feathers are tipped with white. It inhabits the open fields; is often found near the sea; and feeds chiefly upon insects. The Meadow-lark or Meadow-pipit or Titlark (*Anthus pratensis*), common in this country, is not a true lark, although it resembles the latter forms in its general appearance and habits. And the Meadow-lark of North America (*Sturnella ludoviciana*), found very generally distributed over that continent, is also widely different from the true larks. It is allied to the *Sturnidæ* or Starlings, its plumage being of a variegated yellow or black. The American meadow-lark is somewhat larger than the British pipit of that name. It builds its nest within a tuft of grass, and feeds upon insects, seeds, &c. Its song is said to be exceedingly powerful and sweet. In the United States these birds are shot and snared for market, their flesh being regarded a great delicacy.

LARKSPUR (*Delphinium*), a genus of plants of the order Ranunculaceæ, distinguished by its petaloid calyx, the superior sepal of which terminates in a long spur. The stem is herbaceous, bearing alternate leaves, which are usually very much divided; and the flowers are disposed in terminal racemes. Some of the species are common in our gardens, where they are cultivated for the beauty and brilliant colours of their flowers, the prevailing tint of which is blue. Many species are known, all belonging to the northern hemisphere.

LARNE, a seaport and market-town, Ireland, county Antrim, on the north shore of Lough Larne, 18 miles north by east of Belfast. It is composed of one long, regular, and some narrow streets. The bleaching of linen is extensively carried on, and there are four large flour-mills; agricultural produce, lime, and iron ore are exported, while coal, timber, and slate are imported. The harbour, about a mile below the town, is one of the best on the east coast. It is a port of call for the State Line steamers plying between Glasgow and New York, and there is regular steam communication between Larne and

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England and Scotland. Larne is now rapidly extending, and is much resorted to during summer as a watering-place. Pop. 4716.

LARNICA, or LARNACA, a town on the south coast of the island of Cyprus, on a marshy plain about 1 mile from the shore, and consisting of an upper and lower town. The latter is chiefly occupied by warehouses and bazaars, and by the houses of the merchants and traders, seamen, porters, and boatmen. There are a convent, a mosque, and a chapel. In the upper town are a cathedral and a convent. The houses in both have a mean appearance, and the streets are commonly in a filthy condition, which, together with the pestiferous exhalations of the neighbouring marshes, render Larnica an exceedingly unhealthy place of residence. The trade is limited; exports, wheat, cotton, silk, wine, and drugs; imports, rice and sugar from Egypt, cloth, hardware, and colonial produce from Malta, Smyrna, &c. Pop. 10,000.

LA ROCHEFOUCAULD, FRANÇOIS, DUC DE, PRINCE DE MARCILLAC, a distinguished courtier and man of letters under Louis XIV., was born at Paris in 1613. He entered on a military career early in life, and was engaged as an officer at the age of sixteen at the siege of Casale. Shortly after his appearance at the court of Louis XIII. he became suspected by Richelieu of favouring the party of Queen Anne of Austria, and was exiled to Blois. On the death of the cardinal (1642) he returned to court, and was received with kindness by the queen and Mazarin; but not receiving the reward which he thought his services and sufferings merited, he attached himself to the Duc d'Enghien, of whose sister, the Duchess de Longueville, he was for several years the most devoted admirer. In the wars and intrigues of the Fronde he served the party of the parliament, took part in the defence of Bordeaux (1650), was wounded in the face, and for a time almost deprived of sight in the conflict in the faubourg Saint-Antoine of Paris; and at the end of the civil war abandoned the pursuits of ambition for a life of repose and reflection. His house became a resort of the most distinguished wits and people of culture of the time, Boileau, Racine, Molière, Madame de Sévigné, and Madame de La Fayette. He died at Paris in 1680. The first-fruits of his literary activity were his Mémoires sur la régence d'Anne d'Autriche, a spirited representation of that time, first published in 1662. Three years later appeared anonymously the work by which he is now universally known, Réflexions, ou Sentences et Maximes Morales, which passed through five editions in the course of the author's life, and has been frequently republished. An excellent edition, prepared by Gratel-Duplessis, and edited by Sainte-Beuve, appeared at Paris in 1853. The fundamental and prevailing thought in the book, that self-interest is the main-spring of all human actions, is presented with so much piquancy and variety of aspect that the reader forgives for a time the libeller of his race. He left behind him a collection of letters, which were published under the title of Correspondance in 1818.

LA ROCHEJAQUELEIN, HENRI DU VERGIER, COMTE DE, celebrated chief of the Vendean royalists, was born at Chatillon 3d August, 1772. On the outbreak of the revolution his father went into exile, but Henri retired to La Vendée, to the castle of his friend and relation the Marquis de Lescure. The peasants of La Vendée having taken up arms in the royal cause, he placed himself at their head, and addressed them in the short and pithy harangue: 'Let us go to meet the enemy; if I draw back, kill me; if I advance, follow me; if I die, avenge me.' After gaining sixteen victories in ten months, this ardent and brave generalissimo of twenty-two years of age fell at Nouaillé, 4th March, 1794. He was shot by a republican soldier, who had fallen into his power, and to whom he was offering quarter. Marie Louise, marchioness de La Rochejaquelein, wife of his elder brother (who fell in La Vendée in 1815), has written memoirs of the Vendéan war, many of the scenes of which she had herself witnessed while acting as the secretary and aid-de-camp of Lescure, her first husband. One of the best editions of this work was published in Paris in two vols. 12mo, 1862.

LARREY, DOMINIQUE JEAN, BARON, a famous French surgeon, born at Baudéan, near Bagnères-de-Bigorre, studied at Toulouse and Paris, and commenced his medical career as surgeon to a frigate, which in 1787 went to North America. After his return he continued his studies for some time at Paris, and in 1792 was appointed second surgeon to the Hôtel des Invalides. In 1793 he was called to the army, and rendered essential service by the introduction of the ambulance; he also distinguished himself by his intrepidity and spirit. He accompanied the expedition against Corsica in 1794, lived for a short time in Toulon, where he erected a school for surgery, and in 1796 was appointed professor in the medico-surgical school of Val de Grace. Napoleon invited him in 1797 to Italy, and afterwards took him with him to Egypt. In 1805 he was appointed inspector-general of the military medical department, and rendered such important services in subsequent campaigns, that, according to Napoleon, humanity never can discharge its obligations to him. During the Hundred Days, having resumed his former situations under Napoleon, he was present at Waterloo, when he was wounded and taken prisoner. After the second restoration he was superior physician of the royal guard, and remained member of the general council of health; but lost a pension for life of 3000 francs, which Napoleon had bestowed upon him, till it was restored by an express vote of the chamber of deputies. In 1836 he resigned his appointment in the Hôtel des Invalides, and died at Lyons in 1842. His works, all connected with practical surgery, are very valuable, and have been translated into most European languages. He must not be confounded with an uncle and a brother, who both acquired considerable reputation as surgeons.

LARVA, the term applied in natural history to indicate the first and earliest stage in the development of those animals which undergo a metamorphosis (which see) or series of changes in their progress from the egg to the mature and adult state. The class of insects presents many familiar and excellent examples of larval forms, the metamorphic process being very typically represented in these forms. Thus the egg of the butterfly gives origin, not to the perfect winged creature, but to a crawling grub or caterpillar, which is scientifically designated the 'larva;' and through the subsequent transformations and development of this larva the perfect form or *imago* is produced. (See METAMORPHOSIS.) The term is derived from the Latin word *larva*, meaning a 'mask,' the word being thus applied in the abstract to indicate the semi-disguised or temporary nature of the being, when in the larval state. Metamorphosis, and consequently the occurrence of larval forms, is not limited to the insect class, but is present in many other groups of the animal series, both higher and lower than insects. Thus many of the Crustacea—among which Barnacles and Crabs may be cited as two good examples—pass through larval stages; the Echinodermata, including Sea-urchins, Star-fishes, &c., also exhibit larval forms; and even in Vertebrata, as in the case of the Frogs and Newts (Amphibia), we find a larval

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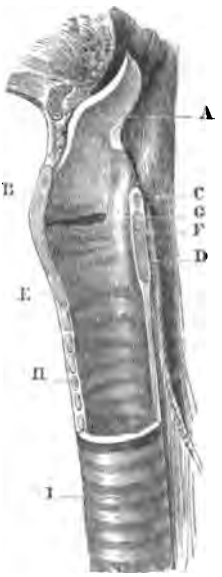
form represented in the course of the metamorphic development. In the majority of cases the larva is wholly unlike the perfect form; as a rule, the more perfect the metamorphosis, the greater is the difference between the larva and the imago. And this difference is one not merely of outward form, but including the internal structure also; the larva being, in the most typical cases, and in every respect, an essentially distinct creature from that which subsequently will be evolved from it. Most larvæ are, further, free, active, and unattached, the characteristic phase of larval habits being the activity of the being as distinguished from the fixed state which many forms assume in their further development, and in their final and adult condition. Thus the larva of the Barnacle or Acorn-shell swims freely about, whilst the adult form is firmly fixed or attached; and in the case of Butterflies, Beetles, &c., we find the larva to be active, whilst the pupa or succeeding state is fixed. The study of the early forms which living beings may thus assume, is of the highest importance in advancing the study of comparative anatomy and physiology; and it is only of late years that the phenomena of development have been studied with the care they deserve. Many purely larval forms were thus long described as adult animals, their connection with the forms into which they subsequently become developed being neither suspected nor traced. The larval crab was thus for long described as a distinct little Crustacean, to which the name of *Zoëa* was given; and many other and similar instances might be cited. The larval condition is most intimately associated with the series of actions comprehended under the term 'nutritive development,' or those actions which, after the development in the egg, have to do with the early growth and nutrition of the form. See METAMORPHOSIS.

LARYNGOSCOPE, an instrument used for examining the interior of the larynx. It consists of a little mirror attached to a flexible stalk of about 6 inches long. This mirror is introduced into the mouth of the patient or person to be examined, and held near the back of the throat, while a strong light is thrown upon it from a reflector worn upon the forehead, or held between the teeth of the examiner. In the strong light of the sun, or of an argand burner, the light thrown from the reflector is concentrated upon the laryngeal mirror, which lights up the parts to be examined, while it at the same time reflects the images of these parts into the eye of the examiner. In this way the mechanism of the human voice may be studied, and what is of considerable importance, disease if present can be readily detected, and the fitting remedy applied. The chief merit of introducing this instrument in a very complete form into medical practice must be assigned to Drs. Turck, of Vienna, and Czermak, of Prague, although Garcia, Liston, Babington, Avery, and others used a reflecting mirror to explore the recesses of the throat. It was not, however, until the two German physiologists took up the subject in 1857 that the benefits arising from its use were fully recognized.

LARYNX, the vertebrate organ of voice, situated generally at the upper part of the *trachea* or windpipe, and formed essentially of a dilatation of the windpipe, with modifications of the cartilaginous rings of that organ. The cartilages composing the larynx are lined internally with mucous membrane, and moved upon one another by special muscles, the entire apparatus being subservient to the production and regulation of sounds. Only one organ of voice, or one larynx, is generally developed, but in birds two of these organs are found. The superior or upper larynx in birds is situated in the ordinary position, at the upper part of the windpipe; and the second, inferior larynx, or *syrinx*, as it is termed, is found at the lower end of the trachea, or at the point where the windpipe divides into the main *bronchi*, or air-tubes which supply the lungs with air. This lower larynx is the true organ of voice in birds. Fishes alone, of all vertebrates, want a true larynx, homologous with the larynx of man; but even in certain of the fishes a rudimentary structure, comparable in some degree with the larynx of higher forms, is found. Taking the larynx of man as the type of the most perfect organ, and as presenting us with the essential parts which enter into the composition of such a structure, we find the skeleton of the organ



Section of Larynx in the median line.—A. Epiglottis, in front of which the hyoid bone and base of the tongue are seen. B. Thyroid cartilage. C. Arytenoid cartilage. D. Posterior portion of cricoid cartilage. E. Anterior portion of cricoid cartilage. F. Vocal cord of right side. G. Ventricle of the larynx. H. Rings of the trachea. I. Trachea.

composed of various gristly or cartilaginous pieces, which are to be viewed, as already stated, as modifications, more or less great, of the ordinary and more simple cartilaginous rings which strengthen the trachea throughout its length. The chief and largest cartilage of the larynx is known as the *thyroid* cartilage, which may be popularly recognized from its forming in front the prominence in the throat known as 'Adam's apple.' The thyroid cartilage is composed of two pieces united in front in the middle line, and projecting forwards at that point, but open widely behind, where its margins are projected to form upper and lower processes. The upper processes of the thyroid cartilage are joined to the processes of the *hyoid bone;* whilst the lower processes unite with the *cricoid* cartilage, which is situated below the thyroid, and which forms the upper ring or cartilage of the windpipe. The *hyoid bone* is of a U-shape, and may be felt with the finger as it lies within the fold at the junction of the neck and chin. Its anatomical position is at the root of the tongue, and it forms the chief seat of origin for the muscles composing that organ. The hyoid bone is divided into a *body* portion, springing from which we find four processes, the two *greater* and two *lesser*

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cornua or 'horns.' The *greater cornua* are united by ligaments (*thyro-hyoid* ligaments) to the upper processes of the thyroid cartilage; and the *lesser cornua* of the hyoid bone are united partly to the body of the bone and partly to the greater cornua. The hyoid bone and thyroid cartilage are further connected together by other membranous and ligamentous structures. The *thyro-hyoid membrane* thus unites the upper part of the thyroid cartilage to the body of the hyoid bone; and other ligamentous attachments between these structures are also described by anatomists. The ring-like cricoid cartilage forming the lower part of the larynx has already been mentioned. This latter structure is narrow in front, but is deeper behind, where it rises to a height of half an inch, and occupies part of the space left between the open *alæ*, or sides of the thyroid cartilage. The cricoid is attached to the thyroid cartilage in front by the *crico-thyroid membrane*, and at the sides by the lower processes of the thyroid cartilage. On each side the cricoid and thyroid cartilages are articulated together by a joint, this arrangement permitting of free and definite movements between the cartilages, which movements assist in the functions of the whole larynx. The two *arytenoid cartilages* form the next structures of importance which fall to be noticed. These cartilages are situated on the upper and back aspect of the cricoid cartilage, and are inclosed within the thyroid cartilage. Each of those structures is somewhat pyramidal in shape, and has three sides: the apex of the pyramid being directed upwards. In the fresh state, the arytenoid cartilages partly inclose between them the *glottis*—a space which resembles the mouth of a ewer or water-jug, and from this resemblance the name *arytenoid* (Greek *arutaina*, a ewer) has been derived. By their oval bases they articulate with the cricoid cartilage; the internal surface of the cartilages, covered with mucous membrane, look towards each other; the hinder or posterior and concave surface of each gives origin to the *arytenoid muscle*, which unites the cartilages and closes the glottis; whilst to the front or anterior and convex surfaces the *thyro-arytenoid* muscles and the *false vocal cords* are united. The *thyro-arytenoid* muscles relax the vocal cords, and approximate the lips of the laryngeal opening or *glottis;* the false vocal cords are the prominent semi-lunar folds of mucous membrane to be hereafter alluded to, and which are so named from their playing little or no part in the production of vocal sounds. At the apex of each arytenoid cartilage a second cartilaginous piece of small size is found, and to these minute structures the name of *cartilages* of *Santorini* has been given. The *epiglottis* forms a structure of great interest and importance in the conformation of the larynx. This structure consists of a single plate of cartilage, shaped like a leaf, the stalk of the leaf being placed inferiorly, whilst its upper and broader portion is free, but is capable of movement in certain important ways. The epiglottis is situated in the middle line, and in front of the glottis or opening of the larynx, being contained within the thyroid cartilage, and between the cornua of the hyoid bone. Its lower and stalk-like extremity is attached by ligament (*thyro-epiglottidean ligament*) to the front of the thyroid cartilage, and on its inner surface. And to conclude the list of the cartilaginous structures of the larynx, the *cartilages of Wrisberg* may be mentioned. These latter are of small size, and are situated in the folds of mucous membrane which connect the epiglottis and the upper part of the arytenoid cartilages. Turning next to examine the soft structures of the organ of voice, we may firstly note the disposition of the mucous or lining membrane of its interior. This mucous membrane has a folded or wrinkled appearance, and is loosely attached to the hard structures beneath. It is highly sensitive, and thus provided with the necessary means for insuring the safety of the glottis or laryngeal opening from being entered by particles of food, a general result of a person endeavouring to speak whilst eating; the glottis in such a case being opened, and free access being afforded to particles of food, which are ejected by the strong spasmodic cough with which we are familiar. The epiglottis, however, efficiently in a natural sense, protects the entrance to the larynx: this structure becoming horizontal, falling over, and closing the entrance to the glottis, when food is swallowed. The retraction of the tongue and elevation of the larynx produce this action of the epiglottis. The upper opening of the larynx communicates directly with the pharynx, or back part of the mouth. It is funnel-shaped—a form caused by the peculiar space inclosed by the arytenoid cartilages, as already mentioned—and below this is seen the true glottis, or *rima glottidis*, the lower opening of the organ of voice. This opening is somewhat triangular in shape, the apex of the triangle being forwards. Behind it is bounded by the arytenoid cartilages, whilst anteriorly the glottis is inclosed by the lower or *true vocal cords*, above which the *false vocal cords*, before alluded to, are situated; whilst between the true and false cords, on each side, a hollow, named the *ventricle of the larynx*, exists, which in turn leads into a front pouch, known as the *sacculus laryngis*. The use of those cavities is supposed to be that of affording space for the vibration of the vocal cords. The *true vocal cords* consist of two elastic cords, extending, in a horizontal manner, between the angle of the thyroid cartilage and the base of the arytenoid cartilages. By the action of these muscles acting upon the arytenoid cartilages, the vocal cords can be brought together, or on the other hand removed from each other; the glottis being, in other words, and by the same action, dilated or closed. And the production of vocal sounds simply results from the tightening and approximation of these cords, when they are made to vibrate by the force of the air which passes them in expiration, various degrees of tension producing different sounds. The length of the vocal cords varies according to age and sex, as also do the proportions of the entire larynx. In adult males the average length of the vocal cords is five-eighths, and in the adult female about four-eighths of an inch. In youth the cords are shorter, especially in boys, the breaking of whose shrill voices results from the elongation of the cords at puberty. The average length of the glottis in adult males is an inch, and in females about 10 lines. The larynx in males and females exhibits little difference in comparative size until the approach of puberty, when the male larynx begins to enlarge, and in about two years attains a size nearly double that of its former extent; whilst in females the larynx also grows larger after puberty, but does not attain so great proportions, or alter so greatly in its intimate constitution, as in males. The shape of the glottis or lower laryngeal opening varies in accordance with the different movements to which the parts of the larynx are subject. When in a state of rest the opening is triangular in shape. During dilatation, as in quiet or deep inspiration, it becomes simply or broadly spear-shaped; and during expiration it returns to its triangular form, a result in the latter case effected more by the elasticity of its ligaments than by muscular contraction. In speaking and singing, where the vocal cords are brought into play, the *vocalizing position* of the glottis is seen, and in this case the opening becomes very narrow and elongated, the

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vocal cords being brought close together, and made very tense, and the edges of the glottis are then made as nearly as possible parallel. The *muscles* of the larynx are very numerous and complicated in their action. Several of these structures have been already mentioned in their relations to the hard structures of the larynx from which they take origin, or to which they are connected. The *arytenoid muscles* have been already mentioned as those which unite the cartilages of that name, and which draw the cartilages together, and so close the glottis. The *lateral crico-arytenoid muscles*, which pass from the sides of the cricoid cartilage to the outer parts of the arytenoid cartilages, have a similar action to the arytenoid muscles, and besides are said to rotate the vocal cords inwards towards the middle line. The *posterior crico-arytenoid muscles* pass from the back of the cricoid cartilage to the outer parts of the arytenoid cartilage, and serve to rotate the vocal cords outwardly, and so to dilate the glottis. The functions of the *thyro-arytenoid muscles* have been already stated to be those of relaxing the vocal cords, by shortening them, and of approximating the lips of the glottis. These latter muscles are situated in the folds of the vocal cords. The *crico-thyroid muscles* are situated in front of the larynx, and arise from the part of the cricoid to be inserted into the lower border of the thyroid cartilage. The action of these muscles is to stretch the vocal cords by rotating the thyroid cartilage in a downward direction. The blood-vessels of the larynx are branches of the *superior and inferior thyroid arteries*, and the laryngeal nerves are the *superior and inferior laryngeal*, or *recurrent laryngeal*, branches of the *pneumogastric nerve*. The functions and mode of action of the larynx will be found more fully discussed under the respective headings of SPEECH and VOICE.

LA SALLE, a thriving commercial and manufacturing city of the United States, capital of La Salle county, Illinois, on the north bank of the Illinois river, 100 miles south-west of Chicago, with which it is connected by both rail and canal. Zinc smelting works and rolling-mills form the principal feature of the industries; while there are besides glass manufactories, extensive hydraulic cement establishments, and manufactures of sulphuric acid, soda-ash, &c. Ice is exported in large quantities to the southern markets. There is a good supply of bituminous coal in the neighbourhood, the annual output of the mines reaching about one million tons. Population (1880), 7845.

LASCARIS, the name of two noble Greeks of the fifteenth century, descendants of the imperial family, who, on the taking of Constantinople by the Turks in 1453, fled to Italy.—CONSTANTINE settled first at Milan, where he was received into the household of Francesco Sforza, the grand-duke, as tutor to his daughter. He afterwards visited Rome and Naples, and finally took up his abode at Messina, whither the fame of his literary attainments attracted many distinguished disciples, and among others the celebrated Pietro Bembo. He was the author of a Greek Grammar, which was first printed at Milan in 1476, and again at Venice in 1495 at the Aldine press. He died in 1493.—JOHANNES ANDREAS (1445–1535) took up his residence at Padua under the protection of Lorenzo de' Medici, who distinguished him by his favour, and despatched him into Greece to purchase valuable manuscripts. He accomplished his mission much to the satisfaction of his employer, and enriched the Florentine collection with the fruits of his researches. In 1494 he quitted Italy and entered the service of Louis XII. of France, who made him his envoy to the Venetian senate; but on the elevation of John de' Medici to the popedom by the title of Leo X., Lascaris went to Rome at the invitation of that pontiff, and on the foundation of his Greek college there was appointed its first principal and superintendent of the Greek press. The remainder of his life was divided between Paris, where he was employed along with Budæus by Francis I. in forming the royal library of Fontainebleau, and Rome, in which latter city he died in 1535. He published a translation of Polybius and of the Argonautics of Apollonius, together with a Greek Anthology (1494, folio); annotations on the works of Sophocles and Homer; four of the plays of Euripides; and a collection of epigrams and apophthegms in Greek and Latin (Paris, 4to, 1527).

LASCARS, native Indian sailors employed in European and American vessels trading to the East.

LAS CASAS, BARTHOLOMEW DE, a Spanish prelate, was born at Seville in 1474, and in his nineteenth year accompanied his father, who sailed with Columbus, to the West Indies. Five years afterwards he returned to Spain, and pursuing his studies he entered the ecclesiastical order. He again accompanied Columbus in his second voyage to Hispaniola (Haiti), and on the conquest of Cuba settled there, and distinguished himself by his humane conduct towards the oppressed natives. He set at liberty the Indians who had fallen to his share in the division; and so much was he interested for them, that in 1516 he went to Spain to lay a statement of their case before King Ferdinand, whose death at that time prevented any measures for their redress. The regent, Cardinal Ximenes, however, appointed a commission to examine circumstances upon the spot, and to determine accordingly. Las Casas was to accompany them, with the title of *Protector of the Indians*. The commissioners found that it was impossible to liberate the Indians, and therefore endeavoured to secure their humane treatment; but Las Casas, still dissatisfied, remonstrated so warmly that he was obliged to take refuge in a convent from the rage of the planters. He again returned to Europe; and on the accession of Charles V., in consequence of his representations, the council appointed a chief judge to re-examine the points of controversy between the partisans of Indian liberty and the colonists. Las Casas, by a singular inconsistency in his zeal for the Indians, became the author of the slave-trade, by proposing to purchase negroes from the Portuguese in Africa to supply the planters with labourers, of the want of whom they complained; and this was unfortunately put into execution. He next applied for a grant of an unoccupied tract, in order to try his own plan with a new colony. This he at length obtained, and with 200 persons, whom he persuaded to accompany him, landed at Porto-Rico in 1521, but found that an expedition was advancing to ravage this very tract, and convey its inhabitants to Hispaniola as slaves. He endeavoured in vain to prevent the threatened danger, and with the few who still adhered to him returned to Hispaniola to solicit succour. During his absence the natives attacked the colonists with such success that in a short time not a Spaniard remained in that part of South America. Las Casas, in despair at the failure of his project, retired to the Dominican convent at St. Domingo, and assumed the habit of the order. Notwithstanding his retirement his zeal in the cause of the Indians did not abate; and being sent on a mission to Spain by a chapter of his order at Chiapa in 1542, he pleaded their cause with his pristine warmth, and composed his famous treatise Brevissima Relacion de la Destruccion de las Indias, in which he exposed the cruelties practised by the Spaniards. His unremitting perseverance at length obtained a new set of laws and regulations, by which

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the natives were greatly relieved. In 1544 he returned to America as Bishop of Chiapa, and continued there until 1551, when he resigned his bishopric, and again returned to Spain. He died at Madrid, 1556. Besides the treatise above-named he was also the author of a treatise in Latin on the question, 'Whether sovereigns may in conscience, by virtue of any right, alienate their subjects from their crown, and transfer them to the dominion of any other lord?' which difficult question he treats with great freedom, spirit, and delicacy. He also composed several works which have never been published, among which is a General History of the Indies, which was a great assistance to Antonio de Herrera in his history. All his works evince profound learning and solid judgment and piety; and notwithstanding his great inconsistency in regard to the negroes, he must be regarded as a very benevolent man and a lover of mankind.

LAS CASES, Emmanuel Auguste Dieudonné Marin Joseph, Comte de, born in 1766 at the castle of Las Cases, near Revel, in Haute-Garonne, served before the revolution as lieutenant of marines. He emigrated in 1791, joined the army of Condé in 1792, and then went to England. After taking part in the expedition to Quiberon he remained in England, and endeavoured to support himself by private teaching. The events of the 18th Brumaire brought him back to France. For several years after he lived in complete retirement, and employed himself in completing his excellent Atlas Historique, which he published under the name of Le Sage. This work is said to have brought him under the notice of Napoleon, who in 1808 made him a baron, and afterwards, in consequence of the encounter with the British at Vliessingen, on which occasion Las Cases acted as a volunteer, admitted him into the council of state as master of requests. From this period he discharged various offices connected with the administration of the interior. After Napoleon's abdication Las Cases refused, in the council of state, to subscribe the act, and went for a short time to England. During the Hundred Days he resumed his former posts, and received new honours. After the battle of Waterloo he asked permission to share Napoleon's fate, and along with his eldest son accompanied him to St. Helena. Here Napoleon dictated to him a part of his Memoirs, and took lessons from him in English. A very strong letter which he endeavoured to forward to Lucien Bonaparte without the knowledge of the governor, Hudson Lowe, caused him and his son to be removed from St. Helena in 1816. After eight months' imprisonment at the Cape of Good Hope he was brought back to Europe, and taken to Frankfort-on-the-Main, where he was placed for some time under Austrian surveillance. After Napoleon's death he was allowed to return to France, where he published the Mémorial de St. Hélène, from which and the Atlas Historique he is said to have derived a profit of nearly 2,000,000 francs (£80,000). The Memorial, is undoubtedly an important source of information as to Napoleon's history; but the materials on which it is based have been very freely tampered with. After the July revolution Las Cases became member of the chamber of deputies for St. Denis, and took his seat on the extreme left. He lived to see Napoleon's remains deposited in the Hôtel des Invalides, and died in 1842.

LASHER, the familiar name of the *Cottus scorpius*, one of the Cottidæ or 'Bullheads,' a group of fishes included among the Acanthopterygii or 'Spiny-finned' fishes of Cuvier, which group is now recognized as one of the subdivisions of the order Teleostei in the modern system of piscine classification. (See Ichthyology.) The Bullheads are nearly allied to the Gurnards, and are noted for the large size of the head, which, together with other parts of the body, is armed with spines. The lasher is about 6 inches in length, and possesses the enlarged head of the Cottidæ. The head is blackish in colour, and is variegated with dark and pale patches placed transversely. The sides, above a roughly-marked longitudinal line, are light-coloured, and are yellow below the line, becoming whiter on the belly. The head and gill-covers are armed with prominent spines, capable of inflicting a severe wound, a circumstance apparently known to the ancients—'Et capitis duro nociturus Scorpius ictu.' The lasher possesses the power of swelling out the head and gill-covers to a large size by the admission of air. It inhabits the Atlantic Ocean, particularly in its northern portion; and is common off the Newfoundland coast, where it is known as the *scolping*. In Greenland it forms a favourite article of diet.

LASSA, or Lhassa, the capital of Tibet; lat. 29° 40′ N.; lon. 90° 57′ E.; situated in a fertile plain surrounded by mountains, on the Galdjan, a tributary of the Dzang-bo. The city proper consists of wide, regular, and clean streets, with mostly large houses of several stories, built of stone, brick, or earth, terraced at the summit, and uniformly whitened externally, the windows and door-frames being painted with the sacred or *lamanesque* colours, red and yellow. Internally, however, they are described by M. Huc as exceedingly dirty and comfortless. All the public edifices worthy of notice are connected with Buddhist monasteries, Lassa being the great centre of the Buddhist religion. In the heart of the city is the convent of Moru, with a large printing establishment, from which numerous religious works are issued; and on the outskirts, toward the cardinal points, are four other large monasteries—Præbung on the west, Sera on the north, Khaldan on the east, and Samie on the south or south-east side. All these have several thousand inmates, being greatly resorted to from China, Turkestan, Nepaul, &c., as schools of philosophy and Buddhism. About 1½ mile north-west from the city, and connected with it by two avenues of trees, is the Bottala or Buddha-la; this is the residence of the Dalai or Talé (Grand) Lama, the ecclesiastical sovereign of Tibet, and supreme pontiff of the vast regions forming Central, Eastern, and South-eastern Asia. A triple-peaked hill here rises abruptly out of the plain to the height of 367 feet; it is covered with convents and cells of monks, and in the centre is the palace of the Dalai Lama, a fine edifice, four stories in height, with a vast number of apartments and a large dome, which, like the columns of the peristyle surrounding the structure, is covered with gilding. The interior is said to be full of idols, treasure, and works of art. Lassa is the principal emporium of Tibet, and a rendezvous of people from all parts of Asia; silk stuffs, tea, and other articles being here exchanged for Tibetan, Indian, and European goods. In the vicinity are many good detached residences of lay inhabitants, and well-cultivated gardens; and no other part of Tibet appears to be so fertile as the district of Lassa. Pop. of city and suburbs estimated at 50,000, a very large proportion of whom are Buddhist lamas or priests, and students in the monasteries.

LASSAIGNE, Jean Louis, was born at Paris, Sept. 22, 1800. He was the son of an engineer in the Jardin des Plantes, displayed early a taste for chemistry, and studied the science under Vauquelin. He soon acquired great skill and facility, and when he was only eighteen began publishing researches, and continued doing so up to the close of his life. After teaching chemistry in the Mercantile School

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at Paris for some time, he in 1828 succeeded Dulong as professor at the Veterinary College of Alfort. Thereafter he devoted himself mainly to the medical applications of the science, and his ability ultimately led him to be appointed as a chemical expert of the Tribunal of the Seine. Among his discoveries and researches may be mentioned the alkaloid *delphinin* in the seeds of *Delphinium staphisagria*, *phosphoric ether*, *phosphovinic acid*, *pyrocitric acid*, and the active principle of senna, *cathartin*. He also contributed largely to the knowledge of the compounds of iodine, of calculi of various kinds, of metallic and other compounds. He made special examination of the medico-legal detection of phosphorus, prussic acid, lead, arsenic, morphia; he pointed out the use of nitric acid and of nitrate of mercury in detecting the adulteration of wool with cotton, wool being tinged yellow and red by these reagents respectively, while cotton is unaffected. He showed how chromate of lead can be used for printing and dyeing, and in 1831 received a silver medal for improvements in the manufacture of pottery enamels. In addition to the papers in which he published his numerous researches, he is the author of several works, of which the more important are, a Dictionnaire des Reactifs, and Abrégé Élémentaire de Chimie, which was largely devoted to medicine. He was a corresponding member of the Imperial Academy of Medicine. He died at Paris March 18, 1859.

LASSO, a long strong thong of buffalo-hide, with a running noose at one end, used by South Americans in the chase. It is thrown in such a way as to fall over the horns or head of the victim, the hunter coiling one end round a high pommel on his saddle. When he makes a successful cast the hunter spurs his horse to its fullest speed, and the wild-horse or buffalo is almost strangled or borne to the ground, and becomes an easy prey. Instead of a noose a leaden ball may be attached to the end of the thong, which is thrown so as to entangle the legs, neck, or horns of the animal to be captured. The lasso has been used in the South American wars: it was employed against the French sentinels by some of the semi-barbarous tribes whom Russia had pressed into her armies during the Crimean war.

LASSO, Orlando di (*Orlandus Lassus*), one of the greatest musicians of the sixteenth century, was born at Mons in Hainaut in 1520 or 1530. Thuanus (De Thou) relates that he was carried off while a child on account of his fine voice. Ferd. Gonzaga, viceroy of Sicily, took him to Italy, and had him instructed in music. Having lost his voice in his eighteenth year, he was occupied three years in Naples as a teacher of music. He then became chapel-master in the Lateran church in Rome. Here he remained two years, and then returned to his native country to see his parents, whom, however, he did not find living. He then travelled with Giulio Cesare Brancaccio to England and France, and lived for some years in Antwerp, whence he went to Munich as chapel-master to Albert, duke of Bavaria. Charles IX. of France invited him to Paris; but Lasso learned on his way to that city the death of the king, and was immediately re-established in his place by Duke William. He remained in this office till his death in 1594. His works were numerous, but are at present rarely to be met with. His sons published a collection of his *motets* under the name Magnum Opus Musicum (Munich, 1604, seventeen vols. folio). In the royal library at Munich is the richest collection of his works.

LATAKIA (anciently *Laodicea ad Mare*), a seaport in Syria, 50 miles south of Antioch, 70 south-west of Aleppo; pop. about 10,000, of whom about a third are Christians. It is a Greek bishop's see. It is situated at the base, and on the south side of a small peninsula, which projects half a league into the sea. It was once surrounded by walls, but is now open, and consists of about 1000 well built houses, situated among groves of myrtle, pomegranate, mulberry, and olive trees, and forming two distinct portions—an upper and a lower town. The harbour is well sheltered, but is shallow, and has a narrow entrance. There is, however, a considerable trade: tobacco, silk, cotton, and gall-nuts being exported. The Latakia tobacco is famous throughout Europe. This place is subject to violent earthquakes. One, in 1796, destroyed a great part of the city, and 2000 of the inhabitants; another, in 1822, overthrew a third of the buildings.

LATEEN SAIL, a long triangular sail, bent by its upper edge to the lateen yard, which hoists obliquely to the mast; it is mostly used by xebecs, feluccas, &c., in the Mediterranean. A gaff-topsail, if triangular, and set on a yard, is lateen.

LATENT HEAT, the heat which enters into a solid to melt it, or into a liquid to vaporize it. It was so called by Dr. Black of Edinburgh in 1760, because it seems to lie hidden in the liquid and the gas. It is now known that the heat is not hidden in Dr. Black's sense; the change of state is a manifestation of its presence; in fact the heat is converted into some form of potential energy, and without this energy matter could not exist in the liquid or gaseous form. It seems that the particles of a solid possess great attractions for one another, and when energy is given them (in the form of heat) to overcome these attractions, and to assume freer relations, they become liquid. Some other change of relation among the particles of a liquid takes place when it becomes a vapour, and this change is again effected by means of heat. We shall suppose that readers know what is meant by a unit of heat. (See Heat (Unit of); Calorimetry; Specific Heat.) When pieces of very cold ice (say at −10° C.) are brought in a pail into a warm room a thermometer shows that they begin to rise in temperature to 0° C.; they begin to melt at 0° C., and cease to rise in temperature; the melted ice remains at 0° C., and if the water and ice are stirred occasionally there is no perceptible change in the temperature of either until the ice has all melted; the water now begins to get warmer, and if placed in an open vessel on a fire will rise in temperature to 100° C., when it will begin to boil; it now remains at 100° C., however hot the fire may be, until it has all been converted into steam at 100° C. It is evident that water at 0° is simply what ice at 0° becomes when a quantity of heat has been given to it, and that steam at 100° is simply what water at 100° becomes when a quantity of heat has been given to it. We know that 1 lb. of water at 0°, and 1 lb. of water at any other temperature, become, when mixed, 2 lbs. of water at a temperature which is the mean of the first two; thus 1 lb. of water at 0° and 1 lb. of water at 79·2° become 2 lbs. of water at 39·6°. But 1 lb. of ice at 0° and 1 lb. of water at 79·2° become 2 lbs. of water at 0°, all the heat of the water being given to the ice to melt it. Thus the latent heat of 1 lb. of water, or the heat which will convert 1 lb. of ice at 0° into 1 lb. of water at 0°, is equal to the heat given out by 1 lb. of water in cooling from 79·2° to 0°. In fact the latent heat of 1 lb. of water is 79·2 units. It is found that 1 lb. of water requires 5·37 times as much heat to change it from water at 100° C. to steam at 100° as the same water would give out if cooled to the freezing-point, that is, the latent heat of 1 lb. of steam from boiling water at 100° is 537 units. This may be experimentally proved by condensing a known weight of steam in a vessel containing a known

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quantity of cold water, and observing the increase produced in the temperature of the water. If 1 lb. of steam at 100° C. is passed into 13 lbs. of water at t° C., when the steam has all condensed there is a mixture of 14 lbs. of water at 49·2°. Now the 13 lbs. of water have been raised 45·2°, and have therefore acquired 587·6 units of heat from the condensed steam; the condensed steam, in cooling from 100° to 49·2° gave out 50·8 units, so that 587·6 – 50·8, or about 537 units, must have been given out by the steam at 100° when condensing to water at 100°. In order to freeze a liquid, or to condense a vapour, it is necessary to take from it its latent heat. When liquid carbonic acid suddenly escapes from a vessel in which it has been confined at a great pressure (see LIQUEFACTION OF GASES), a small portion of it becomes vapour; this vapour requires so much latent heat that all the rest of the liquid becomes a snow-like solid. The heat which becomes latent in the vapour is that which was latent in the rest of the liquid before becoming solid. The heat given out in solidification may be made apparent by means of supersaturated solutions of salts. Supersaturate a solution of sulphate of soda; allow it to cool slowly in a closed vessel in a still place: it will cool without deposition of crystals. If now the vessel is agitated, or if a small crystal is dropped into the solution, solidification begins and goes on with great rapidity, a very sensible amount of heat being given out. A mixture of snow and salt cools bodies placed in it; this is due to the salt combining with the water forming a liquid solution, a process for which, as both solids are melted, a considerable amount of heat is necessary. We give a table of latent heats of liquids:—

	Melting Point.		Latent Heat of Fusion.
Water.....	0° C.	....	79·25
Spermaceti....	13·3	....	82·2
Bees'-wax.....	60	....	97·3
Phosphorus ...	44	....	5·0
Sulphur.....115		....	9·4
Tin.....235		....	14·25
Lead.....332		....	5·4
Mercury	—39	....	2·82

Water may be converted into steam at any temperature by varying the pressure on its surface. (See STEAM.) Regnault eliminated all sources of error in his determination of the latent heat of vaporization of water. He found that the *total* heat necessary to raise 1 lb. of water from 0° C. to any temperature t° C., and then to convert it into steam at t° C., was equal to

$$606{\cdot}5 + {\cdot}305\,t.$$

This *total heat* is evidently equal to *latent heat* + t. (For Regnault's table of results see STEAM.) The following table gives the latent heats of vaporization of certain substances:—

	Boiling-point.		Latent Heat of Vaporization.
Water.....100°		....	537
Alcohol..... 78		....	202
Æther..... 38		....	58
Bisulphide of Carbon.. 46		....	86·6
Acetic Acid.....120		....	102
Oil of Turpentine 156		....	69

LATERAN, a square in Rome, so called from an ancient Roman family of the same name. Nero put to death the last possessor, Plautius Lateranus, and seized his estates. Thus the Lateran palace became the property of the emperor. Constantine the Great gave it to the popes, who occupied it for 1000 years, until the removal of their residence from Rome to Avignon. The church of St. John of Lateran, connected with this palace, was built by Constantine. It is the episcopal church of the pope, and the principal church of Rome; hence the inscription over the principal door—'Omnium urbis et orbis ecclesiarum mater et caput' (the mother and head of all the churches of the city and the world). It is also called the *Lateran*. In the piazza stands the famous relic known as the Scala Santa, which is said to be the stairs of Pilate's house, up which Jesus passed on his way to judgment, and which are now climbed by the faithful on their knees. Its great antiquity, the recollection of twelve councils which have been held in it, and its splendid architecture, render this church particularly worthy of observation among the numerous monumental relics in Rome.

LATHE, a machine for rotating bodies of wood, metal, ivory, or stone in such a way that surfaces of revolution may be cut by a tool held in the hand or fixed in a slide-rest. In the *foot-lathe* the foot of the operator works a treadle, which, by means of a crank and wheel and pulley, causes a *mandril* to which the body is fixed to rotate. The tool is steadied by a rest, and held in the hand at the proper distance from the axis of rotation, so that a great number of perfectly circular cuts are made round the object as the tool is gradually moved along it. Sometimes the tool is fixed in a *slide-rest* in such a way that it may be moved backwards and forwards, or in and out, by means of handles which turn certain screws. When a long shaft has to be turned of the same diameter everywhere, the tool may be slowly moved all along the lathe (keeping at the same distance from the axis of rotation) by means of a screw which gets a slow motion from the mandril. When a great number of surfaces of the same peculiar shape have to be produced the tool sometimes gets its motion from the pressure of a moving pattern. Large lathes are turned by steam-engines. Detailed descriptions of self-acting lathes used in different kinds of turning, screw-cutting, and boring, will be found in treatises on mechanism. Diodorus Siculus mentions the lathe as an invention of Talus; Pliny ascribes it to Theodorus of Samos, and mentions one Thericles as a skilful turner.

LATHS, in architecture, thin, narrow slips of wood from a quarter to three-eighths of an inch thick, and rarely longer than 4 feet, nailed to the uprights of partition walls or the rafters of ceilings to support the plastering, or to the framework of the roof to support the slates or covering. Laths are obtained either by splitting Baltic fir, or sawing Canadian deal.

LATIMER, HUGH, an eminent English prelate and reformer in the sixteenth century, was the son of a respectable yeoman at Thurcaston, in Leicestershire, where he was born about the year 1490. He received his early education at a country school, whence he was removed to Cambridge in his fourteenth year. He first became openly obnoxious to the enemies of innovation by a series of discourses, in which he dwelt upon the uncertainty of tradition, the vanity of works of supererogation, and the pride and usurpation of the Roman hierarchy. At length the Bishop of Ely interdicted his preaching within the jurisdiction of the university; but Dr. Barnes, prior of the Augustines, being friendly to the Reformation, licensed Latimer to preach in his chapel, which was exempt from episcopal interference. The progress of the new opinions was represented to Cardinal Wolsey, who created a court of bishops and deacons to put the laws in execution against heretics. Before this court Bilney and Latimer were summoned, and the former, who was deemed the principal, being induced to recant, the whole were set at liberty, and Latimer was licensed by the Bishop of London to preach throughout England. He had the courage to write a letter of remonstrance to Henry VIII. on the evil of prohibiting the use of

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the Bible in English. Although this epistle produced no effect, Henry presented the writer to the living of West Kinton, in Wiltshire. The ascendency of Anne Boleyn, and rise of Thomas Cromwell, proved favourable to Latimer, and he was, in 1535, appointed Bishop of Worcester. It was then the custom for bishops to make presents on New-year's Day to the king, and, among the rest, Latimer waited at court with his gift, which, instead of a purse of gold, was a New Testament, having the leaf turned down to this passage—'Whoremongers and adulterers God will judge.' Henry was not, however, offended; and when the sturdy prelate was, some time after, called before him to answer for some passages in a sermon which he had preached at court, he defended himself so honestly that he was dismissed with a smile. The fall of Anne Boleyn and Cromwell prepared the way for reverses, and the six articles being carried in Parliament, Latimer resigned his bishopric rather than hold any office in a church which enforced such terms of communion, and retired into the country. Here he remained in privacy until obliged to repair to London for medical advice. There he was discovered by the emissaries of Gardiner, and imprisoned for the remainder of Henry's reign. On the accession of Edward VI. he was released, and became highly popular at court by his preaching, but never could be induced to resume his episcopal functions. He took up his abode with Archbishop Cranmer at Lambeth, where his chief employment was to hear complaints and procure redress for the poor. Soon after Mary ascended the throne Latimer was cited to appear before the council, in doing which an opportunity was afforded him to quit the kingdom. He, however, prepared with alacrity to obey the citation. About the same time Cranmer and Bishop Ridley were also committed to the Tower, and the three prelates were confined in the same room. From the Tower they were conveyed to Oxford, and confined in the common prison, preparatory to a disputation, in which Latimer behaved with intrepidity and simplicity, refusing to deliver anything more than a free confession of his opinions. The three prelates, although condemned, remained in prison sixteen months, chiefly because the statutes under which they had been tried had been formally repealed. In 1555, however, new and more sanguinary laws having been enacted in support of the Roman religion, a commission was issued by Cardinal Pole, the pope's legate, to try Latimer and Ridley for heresy. Much pains were taken during this second trial to induce them to signs articles of subscription, which they steadfastly refused, and were, in consequence, delivered over to the secular arm, and condemned to the flames. This sentence was put in execution about a fortnight after their condemnation, Oct. 16, 1555. At the place of execution, having thrown off the old gown which was wrapped about him, Latimer appeared in a shroud prepared for the purpose, and, with his fellow-sufferer, was fastened to the stake with an iron chain. A fagot, ready kindled, was then placed at Ridley's feet, to whom Latimer exclaimed, 'Be of good comfort, Master Ridley, and play the man. We shall this day light such a candle, by God's grace, in England, as, I trust, shall never be put out.' He then recommended his soul to God, and with firmness and composure expired. His preaching was popular in his own times, in which his simplicity, familiarity, and drollery were highly estimated.

LATIN EMPIRE. See BYZANTINE EMPIRE.

LATIN LANGUAGE AND LITERATURE. See ROME—Language and Literature.

LATINS (*Latini*), the ancient inhabitants of Latium, in Italy. Janus, Saturn, Picus, and Faunus, who were deified by their subjects, are represented to have been the most ancient Latin kings. During the reign of Faunus, Hercules and Evander are said to have arrived in Latium; the latter taught the inhabitants the use of the alphabet, music, and other arts, and also succeeded Faunus in the government. About sixty years afterwards lived King Latinus, at whose court Æneas arrived, married his daughter Lavinia, and succeeded to his throne. These ancient Latins formed a league of thirty cities, of which the town of Alba Longa, said to be built by Ascanius, the son of Æneas, became the head. Although Rome was a colony from Alba she became powerful enough in the reign of her third king, Tullus Hostilius, to seize upon that city, and raze it to the ground. Under Servius Tullius Rome entered the Latin confederacy, and in the reign of his successor, Tarquinius Superbus, was acknowledged as head of the league. On the fall of the Tarquins the Latins regained their independence, and struggled long against the republic to maintain it; it was finally lost, however, by the decisive victory of the Romans near Mount Vesuvius (340 B.C.) Several of their towns received the Roman franchise, and others were converted into allied towns, and are mentioned in history under the general name of Nomen Latinum. Many colonies, consisting of Latins, were founded by the Romans, and formed a part of the Nomen Latinum, although they were not situated within the territory of Latium.

LATINUS. See ÆNEAS.

LATITUDE of a heavenly body is the angle between the ecliptic and a line drawn from the body to the sun (*heliocentric* latitude) or to the earth (*geocentric* latitude); of a place on the earth is the arc of a meridian between the place and the equator. Terrestrial latitude is found (1) by measuring at the place the altitude of the pole-star above the horizon, and correcting for its apparent motion; the altitude of the pole-star is evidently equal to the latitude; (2) by taking half the sum of the greatest and least altitudes of a circumpolar star; (3) by observing the altitude of a star when on the meridian, and calculating the latitude from its known polar distance; (4) on board ship by determining with a sextant the meridian altitude of the sun or moon. The Nautical Almanac gives the declination of the sun or moon at the time; the latitude is found by addition or subtraction. The latitude of a place may be found by other methods.

LATITUDINARIAN, among divines, denotes a person of moderation with regard to religious opinions, in contradistinction to the rigid adherents to particular doctrines. More strictly speaking, the term was applied to those English divines of Charles II.'s time, who, from opposing strenuously both the High Church party and that of the Dissenters, incurred the enmity of both. They endeavoured to allay the contests that prevailed between the more violent Episcopalians on the one hand, and the more rigid Presbyterians and Independents on the other, and also between the Arminians and Calvinists. At present it generally denotes one who commends or sanctions deviations from the strict principles of orthodoxy, and it is frequently used as a term of reproach.

LATIUM, the residence of the Latins, was the name given to the district of Central Italy, on the Tyrrhenian Sea, extending between Etruria and Campania. The limits, however, appear to have changed at different periods. According to Strabo there were, besides the Latins, Rutuli, Volsci, Hernici, and Æqui in this region. No historical value should be attached to the introduction of the Trojan element into Latium by Virgil in the Æneid, the

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national epic of Rome. In the earliest times there was a large laurel grove situated on the coast, at the mouth of the Tiber, which extended as far as the city of Laurentum, to which it gave name. Farther on lay the little river Numicus and the sources of the Juturna; and still farther to the east was situated the city of Lavinium. Beyond the sources of the Numicus and the Juturna was the mountain upon which was placed the city of Alba Longa. Behind this, towards the Hernici, lay Aricia; still farther above, in the extreme north-easterly corner of Latium, was the city of Prænestе; towards the northern extremity of the same province was the city of Tibur, and between these two cities and Rome were Gabii and Tusculum. All these cities were colonies of Alba Longa. The first colony of the Romans was Ostia, established by Ancus Martius, below Rome. The rivers of Latium were the Tiber, the Liris, the Anio, Numicus, Ufens, Amasenus, and Almo. The Ufens flowed through the Pontine Marshes. These marshes were known from the earliest times, and extended between the rivers Ufens and Nymphæus to a great distance. There were also some lakes in Latium, of which Lake Regillus was the principal. The mountains of this province were, with few exceptions (as, for example, the Alban Mountain and Mount Algidus), merely hills. Ancient Latium was much more thickly peopled and much more highly cultivated than the present Campagna di Roma, to which it pretty nearly corresponds; and it must have been healthier, though it was always considered an unhealthy region.

LATONA (by the Greeks called *Lētō*, in the Doric dialect *Latō*,) according to Hesiod daughter of Cœus and Phœbe, became the mother of Apollo and Artemis, by Zeus. During her pregnancy she was persecuted by Hera, by whose command the dragon Python threatened her everywhere with death and ruin, and the earth was not permitted to allow her a place for her delivery. After long wanderings she found rest on the island of Delos (see DELOS), then a floating island. The giant Tityus having attempted to offer her violence, was killed by Apollo and Artemis. Latona is represented as a mild, benevolent goddess, in a sea-green dress. With Artemis she cured the wounded Æneas, and crowned him with glory. When Artemis fled to Olympus from the anger of Hera, Latona carried to her her quiver and arrows, which she had left behind. Latona was worshipped chiefly in Lycia, Delos, Athens, and other cities of Greece. In Crete a festival was celebrated in honour of her, called *Ecdysia*. She is sometimes considered as the symbol of night, because the sun proceeds, as it were, from the night. Hence, also, some derive her name from the Greek *lanthanein* (to hide).

LATOUR D'AUVERGNE-CORRET, THÉOPHILE MALO DE, one of the bravest soldiers mentioned in military history, was born in 1743, at Carhaix, in the department of Finistère (Brittany), early decided to become a soldier, and was aid-de-camp to the Duke De Crillon at the siege of Mahon. When the revolution broke out he was among the first to rally round its standard, and distinguished himself among 8000 grenadiers, in the army of the Pyrenees. Higher appointments were offered to him, but he always declined, declaring that he was only fit to command a company of grenadiers, and was consequently named by Napoleon *First Grenadier of France*. His corps generally made the van-guard, and was called the *infernal column*. After the Peace of Bâle he fell into the hands of the British, and was a prisoner a year in England. After his exchange he occupied himself with literary labours, and in 1799 again bore arms, fought under Massena in Switzerland, and fell at Neuburg, 27th June, 1800, while attached to the army of the Rhine. A monument was erected on the spot where he fell. His heart was embalmed and carried in a silver box by one of the company in which he had served. His name was always called, and the bravest grenadier answered—'Died on the field of honour.' As an author he made himself known by a singular work on the early history of Brittany, entitled Nouvelles Recherches sur la Langue, l'Origine, et les Antiquités des Bretons, 1792.

LA TRAPPE, TRAPPISTS. In a narrow valley of Normandy, in the department of Orne, closely shut in by woods and rocks, and 30 miles north-east of Alençon, Rotrou, count of Perche, founded a Cistercian Abbey in 1140, which, from its difficult access, he called *La Trappe* (trap-door). It was approached by no path, and the traveller was obliged to direct his course by the sun and the appearance of the trees. The deep silence of the wild valley, surrounded by woods and rocks, was sufficient to satisfy the most ascetic disposition. In the sixteenth century, however, the monks had become so licentious that they were the terror of the surrounding country, robbing, murdering, and kidnapping young females; a course of conduct which procured for them the epithet of the 'Bandits of La Trappe.' In the first half of the seventeenth century the abbey, then containing but six or seven monks, was conferred on the celebrated Armand Jean le Bouthelier de Rancé, then (1636) ten years old, as a sinecure benefice. In 1664, after a youth passed in dissipation, he became regular abbot, and accomplished a most rigorous reform of the monastery. The Trappists prayed eleven hours daily, and passed the rest of their time in hard labour and silent meditation. Beyond the sacred hymns and prayers, and their usual salutation, *Memento mori*, no word passed their lips—even their wishes and wants were indicated by signs. Their meagre diet consisted solely of fruits and pulse; meat, fish, butter, wine, and eggs being entirely prohibited. They received no information of what was going on in the world, and no news from their relations: all their thoughts were devoted to penance and death, and every evening they dug their own graves. Louisa, princess of Condé, founded a female order of Trappists. The Trappists were obliged to leave France at the time of the revolution; but a considerable number of them found a shelter at Valsainte, in Switzerland. Driven from this shelter they found refuge at Constance, at Augsburg, at Munich, and ultimately in Lithuania and White Russia. Small communities established themselves in Italy, Spain, America, England, and even in France, at Mont Genèvre, despite the prohibitory law. After the restoration their old home at La Trappe was restored to them. La Trappe continues to be the head monastery of the order, and numbers nearly 200 members. They have now many establishments in France; a few in Germany; one at Mount Melleray, Waterford, Ireland; and several in different states of North America. The professed brothers wear a dark-coloured frock, cloak, and hood, which covers the whole face. There is a female convent not far from La Trappe, and 'Trappist Preachers,' a modification of the order, have established themselves at Pierre-qui-Bire, near Avallon. The monastery at La Trappe was burned, August, 1871.

LATREILLE, PIERRE ANDRÉ, an eminent French zoologist, born 29th November, 1762, at Brives, in the department of Corrèze, early showed a decided inclination for natural history, obtained the chair of entomology in the Paris museum, and was admitted a member of the Academy of Sciences. He died 6th February, 1833. His writings, which are very num-

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erous, include among others natural histories of salamanders, apes, reptiles, &c., the Natural Families of the Animal Kingdom, Genera of Crustacea and Insects, and a Course of Entomology.

LATROBITE, a mineral named after the Rev. C. J. Latrobe. It is found massive and crystallized in forms belonging to the triclinic system; but the crystals are not well defined; colour, pale pink; scratches glass; specific gravity, 2·8; opaque; lustre vitreous. It is composed of—

Silica,	44·65
Alumina,	38·21
Lime,	8·29
Potash,	6·57
Oxide of manganese,	3·16

It is therefore a variety of the anorthite or lime-felspar group. It is found at Amitok Island, near the coast of Labrador, and is accompanied by mica and carbonate of lime.

LATTEN, a species of brass used in the middle ages for metal work of the finer kinds. It probably contained a larger proportion of zinc than common brass, and was consequently harder and paler. The word is now seldom used, but occurs not unfrequently in old English. Mines of latten are mentioned as existing in the time of Henry VIII., and the metal is often alluded to in ancient public records, without students of antiquity being able to determine what metal is meant. Three varieties were distinguished, the *black*, the *shaven*, and the *roll*. That used by English workmen used to be imported from Germany and the Netherlands, the finest kind being known as Cologne plate. Small articles that were gilt or silvered, and sold as being of the precious metals, were often manufactured by fraudulent tradesmen; and there were special provisions in the Judgments of the city of London for punishing by the pillory persons guilty of this practice. Lattenners formed one of the recognized crafts of the city of London. In some localities the term is still applied to plate-tin.

LAUBAN, a town in the province of Prussian Silesia, situated in a picturesque valley on the left bank of the Queis, and 40 miles W.S.W. Liegnitz. It has manufactures of woollen and linen cloth, thread, yarn, tobacco, bleachfields, printfields, calendering and dye works, tile-works, a bell-foundry, breweries, and several oil, flour, and other mills. Pop. (1880), 10,775.

LAUD, WILLIAM, Archbishop of Canterbury in the reign of Charles I., was born at Reading in Berkshire, 7th October, 1573, and received his education at St. John's College, Oxford, of which he became a fellow in 1593. He took priest's orders in 1601, and the following year preached a divinity lecture of such Popish tendencies that it was strongly disapproved by Dr. Abbot, master of University College, and laid the foundation of that animosity which ever after subsisted between them. In 1608 he was made chaplain to Neile, bishop of Rochester, from whom he received considerable preferment; and he soon after preached his first sermon before James I. In 1611 he became president of his college and one of the king's chaplains, and in 1617 accompanied James I. to Scotland to aid him in his attempt to bring the Church of Scotland to a uniformity with that of England. In 1620 he was installed a prebend of Westminster, and the next year nominated to the see of St. David's. About this time James took upon himself to interdict the introduction into the pulpit of the more distinctive Calvinistic doctrines, or of any matter relative to the powers, prerogatives, and sovereignty of foreign princes. These measures being attributed to the counsels of Laud, the Calvinistic or Puritanic party were much incensed at his conduct. On the accession of Charles I. Laud's influence, by the countenance of Buckingham, became very great. In 1626 he was translated to the see of Bath and Wells, and in 1628 to that of London. The year before he had been made a privy-councillor. On the sequestration of Archbishop Abbot Laud was appointed one of the commissioners for exercising the archiepiscopal jurisdiction; and being a zealous supporter of the administration of Buckingham, became in the highest degree unpopular. On the assassination of that favourite by Felton, Laud, suspecting that some members of Parliament might be privy to the deed, prevailed on the king to send to the judges for their opinion 'whether by law Felton might not be racked?' He was also the most active member of the high-commission court, the arbitrary and severe proceedings of which were so odious to the nation. In 1630 he was elected chancellor of the University of Oxford, to which he was a great benefactor, and which he enriched with an invaluable collection of manuscripts, 1300 in number, in various languages, ancient, modern, and oriental. In 1633 he was promoted to the see of Canterbury, vacant by the death of Archbishop Abbot. On the same day an agent from the court of Rome came to him privately, and offered him a cardinal's hat—a fact which shows how strongly he was suspected of a predilection for the Church of Rome. In the same year he was made chancellor of the University of Dublin. In 1634 he commenced a metropolitan visitation, in which the rigour of his proceedings to produce conformity was exceedingly unpopular. He was likewise appointed one of the commissioners of the treasury, in which situation he remained a year. The odium of the prosecution of Prynne, Burton, and Bastwick for libel, and of the severe sentences that followed (14th June, 1637), rested principally upon him. In 1636 he founded the professorship of Arabic at Oxford, and endowed it with lands in the parish of Bray, in Berkshire. After a lapse of twelve years a Parliament was convened in April, 1640; the Commons commenced by appointing committees of religion and grievances, on which it was suddenly dissolved, after sitting only three weeks. A clerical convocation was also authorized by the king, to sit independent of the Parliament. This body, besides granting subsidies, prepared a collection of constitutions and canons ecclesiastical, which, being approved by the privy-council, was made public, and gave such general disgust to the moderate of all parties, and produced so great a number of petitions to the privy-council, that Charles was obliged to suspend them. On the calling of the Long Parliament the new canons were summarily disposed of as subversive both of the rights of Parliament and of the liberties and property of the subject, and the long-gathering storm immediately burst over the head of the archbishop. The next day articles against him were read in the House of Lords, and being referred to the Commons a motion was put and carried that he had been guilty of high-treason. The celebrated Denzil Holles was immediately sent to the House of Lords to impeach him in the name of all the Commons of England, and he was delivered into the custody of the black rod. February 26, 1640–41, fourteen articles of impeachment were brought up from the Commons, and he was committed to the Tower. He remained in prison three years before he was brought to trial, which at length, on the production of ten additional articles, took place March 12, 1643–44, and lasted twenty days. Many of the charges against him were insignificant and poorly supported. His own defence was acute and able; and his argument —that he could not be justly made responsible for the actions of the whole council—was difficult to

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answer. The Lords were still more staggered by his counsel showing that, if even guilty of these acts, they amounted not to high-treason. A case was made for the judges, who very much questioned if they were so, and the peers deferred giving judgment. On this delay the House of Commons passed a bill of attainder, January 4, 1644–45, in a thin house, in which the archbishop was declared guilty of high-treason, and condemned to suffer death—as unjustifiable a step, in a constitutional point of view, as any of which he was accused. To stop this attainder he produced the king's pardon under the great seal; but it was overruled by both houses, and all he could obtain by petitioning was to have his sentence altered from hanging to beheading. He accordingly met his death with great firmness, Jan. 10, 1644–45, on a scaffold erected on Tower Hill, in the seventy-second year of his age. Little can be fairly pleaded for his severity and violence, except the probability that he acted on principles which he deemed correct. His diary, published by Wharton in 1694, shows his piety to have been mingled with much puerility and superstition; his dreams being regularly recorded, as well as the hopes and fears which they excited. Among his works are sermons; Annotations upon the Life and Death of King James; his Diary; the Second Volume of the Remains of Archbishop Laud, written by himself; Officium Quotidianum, or a Manual of Private Devotion; and a Summary of Devotion. An edition of his works was published by Parker (Oxford, 1857–60).

LAUDANUM. See OPIUM.

LAUDER, a royal and parliamentary burgh, Scotland, county Berwick, on the Leader, 25 miles south-east of Edinburgh; it is irregularly built, but is a very healthy place. It has a town-house, a parish, a Free, and a United Presbyterian church, and several schools. It unites with Haddington, Berwick, &c., in returning a member to Parliament. Pop. in 1881, 964.

LAUDER, SIR THOMAS DICK, BART., an eminent popular writer, was the only son of Sir Andrew Lauder, Bart., of Fountainhall, in East Lothian, and born in 1784. In early life he entered the army, and served for a time as an officer of the 79th Regiment. Having quitted it he devoted the remainder of his life to the pursuit of science and literature. His first contributions were to the Annals of Philosophy, a magazine conducted by Dr. Thomson, professor of chemistry in Glasgow University, and he afterwards acquired great reputation by his paper on the Parallel Roads of Glenroy, read before the Royal Society of Edinburgh, in which he was the first to maintain the now generally received opinion of these famous pathways being the result of geological action. On the establishment of Blackwood's Magazine in 1817 he furnished to its pages the tale of Simon Roy, Gardener at Dumphail, which was so vigorously written as to be ascribed to the author of Waverley. Numerous other articles were written by him for the same periodical. His next attempt was in the domain of historical fiction; and his romances of Lochandhu and the Wolf of Badenoch gained considerable popularity at the time, though, from the author's inability to reproduce, with the dramatic colouring of Scott, the manners and customs of the fourteenth century, they are now almost forgotten. In 1830 he succeeded his father in the baronetcy. and in the same year published what may be regarded, perhaps, as the best of his works, his graphic and interesting Account of the Moray Floods in 1829, of which he was an eye-witness. In addition to the works already enumerated are his Highland Rambles and Long Tales to Shorten the Way; editions of Gilpin's Forest Scenery, and Sir Uvedale Price on the Picturesque; a Tour round the Coasts of Scotland; and the Queen's Visit to Scotland in 1842. He also contributed one or two sketches to Mrs. Johnstone's Edinburgh Tales. Sir Thomas expired at his seat of the Grange, near Edinburgh, on 29th May, 1848.

LAUDERDALE, JOHN MAITLAND, DUKE OF, of some notoriety as a persecutor of the Covenanters, was born at the family seat of Lethington, in Scotland, on 24th May, 1616, and was eldest son of the first Earl of Lauderdale, by a daughter of Seton, earl of Dunfermline. After an education chiefly in the classics, in which he made some proficiency, he entered public life as a zealous Presbyterian, and was employed on several occasions by the Covenanters to represent and further their interests. In 1643 he was one of a Scottish deputation who waited on Charles I. for the purpose of urging upon him the adoption of moderate views; the same year he sat in the Westminster Assembly of Divines as an elder of the Church of Scotland; and not long afterwards, having succeeded to his father's title, he was a party to the delivery of the king to the English army at Newcastle. He was subsequently one of the Scottish commissioners who entered into negotiation with the king in 1647, and secretly obtained his signature to an engagement to rule in accordance with the Covenant, in return for their undertaking to raise an army in his behalf and invade England. To give effect to this arrangement he proceeded to Holland for the purpose of inducing Charles II., then Prince of Wales, to embark with him for Scotland, and place himself at the head of the invasion. He had failed in his mission, and was preparing to return alone, when the news of the disaster at Dunbar, and the condemnation of the engagement by the Scottish Parliament, induced him to remain at the Hague. When at last, in 1650, Charles II. ventured to embark for Scotland, the Earl of Lauderdale accompanied him, and appears to have stood high in his favour, though his own unpopularity was now so great that he was, as one of the 'Engagers,' at the request of the estates, forbidden the king's presence, in conformity with the provisions of the Act of Classes passed 4th June of the same year. The ruin of the royal cause appears to have removed this interdict, and Lauderdale was in attendance on the king as a favourite when the defeat at Worcester (September 3, 1651) left his adherents no alternative but flight or concealment. Lauderdale, unable to do either, was taken on the field, and remained a prisoner till Monk's arrival in London, in 1660, set him at liberty. The first use he made of it was to repair to the Hague and reinstate himself in the royal favour. His success was complete; and appointment after appointment showered upon him, till the government of Scotland was entirely in his hands. He might now have been a blessing to his country; and as he had hitherto professed to be both a stanch Presbyterian and a friend of limited monarchy, there was some ground to hope that his rule would be better at all events than that of such predecessors as Middleton and Rothes. But after some show of reluctance he approved of the imposition of Episcopacy on Scotland, and, like all apostates, was more violent in enforcing the new form of worship even than the most violent of those who were Prelatists by birth and education. His own interest, and the promotion of it by slavish subserviency to the court, were his only rules, and Scotland was left to groan under a tyranny as cruel and loathsome as had ever cursed any people. Meanwhile Lauderdale's ambition was liberally gratified. In 1672 he was created Duke of Lauderdale and Knight of the Garter, and in 1674 was raised to the English peerage under the title of Viscount Petersham and Earl of Guildford. Being thus admitted to an influential

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share in English politics, he became one of the junta of five known by the name of the 'Cabal;' and by his tyrannical and overbearing conduct soon made himself as obnoxious to the English as to his own countrymen. In consequence of an address by the House of Commons, he was in 1682 removed from all his employments, and from his majesty's presence and counsels for ever. He lived only a few months after his disgrace, dying 24th August, 1682.

LAUENBURG, or SAXE-LAUENBURG, a duchy now incorporated in the dominion of Prussia. It formerly belonged to Hanover, passed with that country in 1803 under French government, was restored in 1813 to its former state; in 1815 was ceded to Prussia, which soon after gave it up to Denmark. It remained with Denmark till 1864, when it was ceded to Austria and Prussia, and the next year, the former power having resigned its rights to the latter for a money compensation, Prussia took possession of the duchy. It contains at present 450 square miles, with 49,466 inhabitants, is situated on the right bank of the Elbe, and is surrounded by the territories of Hamburg, Lübeck, Hanover, Mecklenburg, and Holstein. Grazing and tillage, together with the transit trade, are the sources of its wealth. It exports much wood for fuel and building. Ratzeburg, the seat of the administration of the duchy, is situated on an island in a lake. It has 3720 inhabitants.

LAUGHING GAS, a name given to nitrous oxide after its remarkable physiological effects were discovered and illustrated by Sir Humphry Davy in his Researches, published in 1800. The effects are generally of a pleasurable kind, and the person under the influence of the gas is more or less excited, dancing, singing, laughing, or indulging in other violent motions. This by prolonged inhalation ceases, and stupor and anæsthesia, or insensibility to pain, supervene. Hence the use of this gas in certain surgical operations.

LAUGHING JACKASS, or GIANT KINGFISHER (*Dacelo gigas*), a bird allied to the kingfisher, deriving its former title from the singularly strange character of its cry. It is an inhabitant of Australia, being found chiefly in the south-eastern portion of that country, and in New South Wales. It is not supposed to exist in Tasmania. Though a common bird it is never found anywhere in great numbers. Its entire length is 18 inches, and it is powerful in proportion. Unlike the other kingfishers it is comparatively careless about catching fish; but it eats crabs with avidity, and also insects, small mammalia, and reptiles. It is a dexterous captor of snakes, and sometimes, though not often, makes a prey of fish. Its singularly abrupt and dissonant cry fills the novice in the bush with strange panics. As it utters its strange cry with the greatest liveliness at the approach of dawn and at the return of darkness it has earned for itself the soubriquet of the Settler's Clock. It is not fastidious in its choice of a locality, being found indifferently in the bush, forest, and open plain. It can be readily tamed. It makes no nest, but deposits its eggs in the decayed hollow of a gum-tree. It has a dark brown crest, and its back and upper surface is olive-brown. The wings are brown black, and the breast and under portions white, crossed by faint bars of pale brown. The tail is longish, with a rounded extremity tipped with white; its colour is a rich chestnut, with deep black bars.

LAUGHTER arises from an excited condition of the nervous system, and is an emotion entirely confined to the human species. Physically it consists in a convulsive action of the diaphragm; but there are several accessories, such as the sharp vocal utterance resulting from the violent tension of the larynx, the change produced on the features, which may vary from an almost imperceptible smile to a violent contortion, and the effusion of the eyes by a secretion from the lachrymal glands. In a state of good health it is caused by hilarity or an overflow of animal spirits, and is a pleasant sensation; but it occasionally assumes a painful character, as in hysteria, where it is the effect of disease. Being then no longer under the control of the will it is usually followed by extreme exhaustion.

The mental phenomena of laughter are much more complicated, and have, together with the class of objects by which it is produced, given rise to much discussion. Numerous theories, though none entirely satisfactory, have been propounded to explain and determine the common characteristic of the 'laughable' or 'ludicrous;' but the ancients display more unanimity in their conclusions than the moderns do. Aristotle, De Poetica, vi. s. 1, defines the ridiculous to be some error in truth or propriety, but at the same time neither painful nor pernicious, that is, there must be some deviation from the ordinary appearances of nature, on the side of degradation or inferiority, but not of a character to excite the emotion of pity. Cicero, De Oratore, ii. n. 235, enunciates an opinion almost identical, for he admits that the chief, if not the sole, object of laughter is that which, without impropriety, marks out and exposes an impropriety. Quintilian holds, with Cicero, that the improper and deformed constitute the proper province of ridicule, and that ridicule and contempt are nearly allied. He therefore agrees substantially with Hobbes, who defines the source of laughter to be 'a sudden glory, arising from a sudden conception of some eminency in ourselves by comparison with the infirmity of others, or with our own formerly' (Human Nature, chap. ix. s. 13). This theory, from the harsh judgment of human nature implied in it, has never been popular, for though it may include those cases in which laughter is expressive of ridicule, derision, or contempt, it totally excludes these common and numerous instances of genial laughter that are associated with no idea of degradation, and takes no account of those in which the feeling of contempt from manifest degradation does not urge to laughter. Beattie and Priestley are at one in tracing the 'ludicrous' to the idea of the misrelation or incongruous union of objects, while Lord Kames considers its essence to be contrast. Campbell, in his Philosophy of Rhetoric, b. i. chap. ii., remarks that 'ridicule in futile objects hath a similar effect to that produced by what is called the vehement in solemn and important matters.' In his Essay on Wit and Humour in the Characteristics Shaftesbury makes ridicule the test of truth—a maxim that admits only of a negative application, for though ridicule may aid in confuting error it can in no way assist in establishing the truth. The ridiculous is not any essential and inherent quality of objects, but owes its existence very much to association and to the idiosyncrasies of individual minds. Social accidents, and accidents of education, as well as differences of temperament, are potent factors in the production and modification of the ludicrous. There can be little doubt, however, that the pleasure of degrading something enters more or less intensely into the majority of cases of the genuinely ludicrous, but not necessarily, as implied in the definition of Hobbes, to the extent of producing contempt or derision for the object of laughter.

LAUMONITE, or LAUMONTITE, a mineral named in honour of Gillet de Laumont, who discovered it in 1785. It occurs in aggregated crystalline masses, deeply striated, or in separate crystals, of several varieties of form, and sometimes in that of its primary crystal, an oblique rhombic prism, of which the

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inclination of the terminal plane is from one acute angle to the other. It is white, sometimes with a tinge of red, and is translucent, and hard enough to scratch glass. By exposure to the air (even for a very short time) it becomes opaque, tender, and eventually falls into a white powder; specific gravity, 2·3. Before the blowpipe it intumesces, and fuses with difficulty into a colourless glass. It is composed of silica 52·04, alumina 21·14, lime 10·62, and water 14·92. It was first noticed in the lead-mines of Huelgoet, in Brittany, lining the cavities of veins. It has since been found in trap in Ireland and Faroe, Transylvania, Nova Scotia, near New Haven, Connecticut, and in Mull, Kilpatrick Hills, Hartfield Moss, Glen Farg, and other localities in Scotland.

LAUNCESTON, a parliamentary borough and market town of England, county of Cornwall, 19 miles north by west of Plymouth. It is generally well built, and has a remarkably fine church, several Dissenting chapels, two handsome new market-places, a grammar, national, and board schools, and various benevolent and charitable institutions. Retail shop trade and agriculture are the chief employments. Launceston returns a member to Parliament. This town was long considered the capital of Cornwall: but Bodmin is now the chief town. Pop. 5675.

LAUNCESTON, the second town of Tasmania, 120 miles north of Hobart (with which it is connected by rail), at the confluence of the North and South Esk rivers, the united stream taking after this the name of the Tamar, which is navigable up to the town from the sea at Port Dalrymple, a distance of 40 miles. The streets are regularly laid out, and many of its buildings handsome. The principal of these are several of the churches, the government house, town-hall, military barracks, jail, and courthouse. There are also public schools, banks, post-office, and several newspaper establishments. Steamers run to Melbourne twice a week, and to Sydney once a fortnight. Pop. (1881), 12,752.

LAURACEÆ, a natural order of exogenous plants inhabiting the cooler parts of the tropics and some temperate countries. The perianth has four or six divisions, usually in two rows, with the limb sometimes obsolete; stamens perigynous; anthers two to four-celled; ovary superior, unilocular; ovule solitary, pendulous; and fruit a berry or drupe, the peduncle sometimes becoming fleshy. Their zone is properly the sub-tropical, and while they abound in Asia and America few are found in Africa. There are two sub-orders: 1. Laureæ—true laurels, trees with leaves; 2. Cassytheæ—dodder laurels, climbing parasitic plants without leaves. In general the plants of the order are aromatic and fragrant, and many of them are tonic and stimulant. The leaves of the sweet bay contain a volatile oil, and the dark green odoriferous concrete oil known as oil of bay is obtained by expression from the dark coloured fruit. Some species of laurel supply useful timber; and others are so aromatic that their seeds have been used as substitutes for nutmegs.

LAUREATE, Poet, an officer in the lord-chamberlain's department of the royal household of Great Britain. The appellation seems to have been derived from *laurus*, a bay or laurel, in allusion to the ancient practice of crowning poets. Graduates in rhetoric and versification in the English universities were presented with a laureal wreath, and were in consequence styled *Poetæ Laureati*. The royal laureate was therefore merely a graduated rhetorician in the king's service. In England traces of a stipendiary royal poet are found as early as the reign of Henry III. and under Edward IV. John Kay received the appointment under the express title of poet-laureate. Skelton, in the reign of Henry VII., in several of his poems, gives himself this title. He was one of the last who received the academic degree, and he appears to have held the same dignity at court. The two dignities, however, were essentially distinct. The university custom seems to have become extinct in the reign of Henry VIII., the last who is known to have received it being R. Whittington, at Oxford, in 1512. Ben Jonson is said to have been poet-laureate to James I. The first patent appears to have been granted in the reign of Charles I., 1630, the pension attached to it being £100 a year, with a tierce of Canary, which during the laureateship of Southey was commuted into an annual payment of £27. The laureate was required to furnish an ode on the birth-day of the sovereign or on the occasion of a national victory; but this custom was discontinued towards the close of the reign of George III. Since the time of Charles II. the following poets have in succession held the office of laureate:—John Dryden, Nahum Tate, Nicholas Rowe, Lawrence Eusden, Colley Cibber. William Whitehead, Thomas Warton, Henry James Pye, Robert Southey, William Wordsworth (with a salary of £300), and, since 1850, Alfred Tennyson.

LAUREL (*Laurus*), natural order Lauraceæ, a genus of plants consisting of trees or shrubs, mostly aromatic, and often remarkable for the beauty of their foliage. The leaves are simple, generally alternate, and the flowers small and inconspicuous. The species inhabit the tropical parts of the globe and the warm regions in the vicinity; two of the American species, however, extend to a high northern latitude. Cinnamon, cassia, and camphor are obtained from different species of *Laurus*. The sweet bay (*L. nobilis*), so celebrated by the ancient poets, and used to decorate temples and the brows of victors, is a small ornamental evergreen tree inhabiting the south of Europe and north of Africa. The red bay (*L. Caroliniensis*) inhabits the southern parts of the United States of America from latitude 37° to the Gulf of Mexico, and is found westward beyond the mouths of the Mississippi. It is a beautiful tree, growing in the low grounds, in company with the cypress, and sometimes attains the height of 60 or 70 feet, with a trunk 1 foot or 18 inches in diameter. The leaves have an aroma very similar to that of the *L. nobilis*. The sassafras, so remarkable for having its leaves either simple or divided into two or three lobes, also belongs to this order. The root is employed in medicine. It is common in America, as far north as latitude 43°, and extends westward even into Mexico. The *L. benzoin*, or fever-bush, is an agreeably aromatic shrub, as widely extended throughout the United States as the preceding. The avocado pear, which forms a frequent article of nutriment in the West Indies, and is much cultivated for that purpose, is the fruit of *Persea gratissima*, belonging to this order. It contains a fixed oil.

LAUREL, Products of. The fruit of the sweet bay-tree, or *Laurus nobilis*, has been analyzed, and nearly twenty substances have been isolated. Besides water, lignin, and starch, which constitute nearly 85 per cent. of the whole seed, there are several oily and fatty matters which are to some extent characteristic. The *ethereal oil of laurel*, of which the seeds yield about ¼ per cent., is a colourless or yellowish oil of specific gravity 0·88 at ordinary temperatures, which thickens as the temperature falls, and is quite solid at 32° Fahr. It has an odour of laurel, a strong, bitter taste, and is lævorotatory. According to some it is a mixture of a camphene and eugenic acid, but according to others, when treated with potash it yields *lauric* acid. *Laurel fat*, which is got by squeezing the fruit, is yellowish-green, buttery, or granular, and has the taste and odour of

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the oil. It is readily soluble in ether. It is a complex mixture, for there have been separated from it a fat and a resin, the ethereal oil, and substances called respectively *laurostearin*, and *laurel camphor* or *laurin*. The latter can be also got by digesting the pounded berries in strong alcohol, evaporating, removing the deposited laurostearin, and then crystallizing the laurin from the solution. It is white, tasteless, and odourless, insoluble in water and in alkalies, but soluble in alcohol and ether. *Laurostearin*, or laurate of glyceryl, is a fat found not only in the berries of the sweet laurel, but in cocoa-nut oil and pichurim beans. As got from these sources it is in white silky needles, melts at 112° Fahr., and is readily soluble in ether. When saponified it yields glycerin and laurate of the alkali employed. From this alkaline salt it is easy to get the *lauric* acid ($C_{12}H_{24}O_2$), which was first discovered by Marsson in 1842. It is found in a great variety of fats, for example, spermaceti, cocoa-nut oil, croton-oil, pichurim-bean fat, &c., from which it is best got by saponification, separation of the laurate, and purification from what other fatty acids may be present. It is the twelfth in the fatty acid series (which see), is crystalline, forming tufts of silky needles in a solution, or a scaly mass when cooled after fusion. It melts about 112° Fahr., is soluble in alcohol and in ether, is insoluble in water, but evaporates with the steam, and has a slight acid reaction. It is a monobasic acid, and its salts are in general insoluble in water. *Laurel fat*, or *laurel butter*, is used for embrocations in rheumatism, paralysis, deafness, and convulsive coughs.

The cherry-laurel also yields a volatile oil when its leaves are distilled with water. It is pale yellow and heavier than water, and closely resembles oil of bitter almonds. It contains prussic acid, which apparently is not present originally in the leaves, and hydride of benzoyle, so that the same action apparently takes place as in the production of that oil. The only difficulty is that no body analogous to emulsine (which see) has been found in the leaves. The oil absorbs oxygen from the air, and gives a deposit of benzoic acid. The oil is of course poisonous. Cherry-laurel, or bay-leaves, are often used in cookery as a flavouring ingredient. *Laurel-water* is got by macerating the chopped leaves in water for a day, and distilling off a portion of the fluid. If necessary it is filtered, and is preserved in a close bottle. It may be used as a flavouring ingredient, but as it contains prussic acid it must be very cautiously dealt with. As it is naturally colourless the compound tincture of lavender (which see) is sometimes added to it. Historically this is a rather famous preparation, as it was by means of it that Dr. James Price, the last of the alchemists, committed suicide in 1783; and it was probably familiarly known for its poisonous virtues long before that date.

LAURENT, Auguste, one of the most notable chemists of modern times, was born at La Folie, near Langres, in Haute-Marne, Nov. 14, 1807. Nothing is said about his earlier life, but when he was about twenty-two years of age he was a mining engineer, then assistant at the School of Arts, chemist to the Sèvres porcelain work, principal of a chemical school in Paris, then chemist to a porcelain work in Luxemburg, and finally, in 1838, professor to the Academy of Sciences of Bordeaux. This post he held for six years; in 1845 he was elected a corresponding member of the Academy, and the year following he took up his abode in Paris. In 1848 he was made assayer to the mint and chemical adviser of the minister of war. He died at Paris April 15, 1853, in comparative poverty, and his wife and family had to be taken care of by the government. During his short and troubled life he contrived to do a great amount of work. His researches were very numerous; they embraced all departments of the science, organic and inorganic, and opened up new fields and new views. He was one of the champions of the unitary system against the dualistic, which was supported especially by Berzelius, but also by most of the chemists of the time. He was opposed also to the electro-chemical theory, which his investigations into the derivatives of naphthaline did so much to shake, and maintained the doctrine of types—forms of constitution of bodies which admitted of parts being substituted by other elemental or compound substances without the type of the original body being altered. His views on general chemical theory appeared in a posthumous work entitled Méthode de Chimie, 8vo, Paris, which was translated into English by Professor Odling, and was published by the Cavendish Society, 1855. It is enough to say that many of the doctrines advocated as novelties in that book are now universally accepted, and have become a fundamental part of modern chemical theory, chemical classification, and chemical instruction.

LAURITE. This mineral, which is a double sulphide of osmium and ruthenium, crystallizes in regular octahedra. It is very hard, but brittle; specific gravity, 6·99; it has a bright metallic lustre, and dark iron black colour. It is infusible before the blowpipe, but oxidizes; it is not attacked by aqua regia. This very stable mineral has been found mixed with platinum from Borneo.

LAURVIG, a seaport town of Norway, in the province of Aggershuus, beautifully situated at the head of a small fiord of same name, at the mouth of the Lauven, 67 miles S.S.W. of Christiania. It is built in the form of a crescent, is defended by a castle, and has an excellent harbour, with depth of water for the largest vessels. The valuable salmon fishery of the river employs many of the inhabitants, and the Fritzo iron-works in the vicinity are among the largest and most complete in Norway. Pop. (1875), 7681.

LAUSANNE, a town in Switzerland, capital of the canton of Vaud, on a spur or lower slope of Mount Jorat, about ½ mile north from Ouchy, its port on the lake, and 31 miles north-east of the town of Geneva. It is irregularly built on three hills and several intervening valleys, and many of the streets are very steep, while all of them may be regarded as a series of ups and downs. Two of the hills are united by a lofty bridge about 80 feet high, 33 broad, and 582 long. The edifice most deserving of notice is the cathedral, of Gothic architecture, and, at least internally, the finest building of the kind in Switzerland. It was founded A.D. 1000, but only a few traces of the original edifice remain. It is adorned with a lofty tower and a spire 200 feet high. The old castle, originally the residence of the bishops of Lausanne, is now the council-house of the canton. The only other buildings deserving of notice are the church of St. Francis, the college, with its museum; the penitentiary, prison, theatre, asylum for the blind, and normal school. Gibbon here completed his History of the Decline and Fall of the Roman Empire, and his house, much altered, now forms the Hôtel Gibbon. Lausanne has scarcely any trade; and its limited manufactures are confined to leather, pipes, beer-brewing, and cotton and woollen spinning. In 1875 it became the seat of the supreme court of the republic. Pop., almost all Protestants (1880), 30,179.

LAUSITZ. See Lusatia.

LAUTER. See Kaiserslautern.

LAVA is the name given to those products of volcanic eruptions sent forth in fiery streams from the

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interior of the earth, and which, though they become stationary on cooling, are, in consequence of the gases which accompany them, more or less inflated, and seldom form very dense rocks. The constituents of lava are entirely similar to those of basalt, greenstone, porphyry, &c., which were no doubt formed in a similar manner, and are in this respect completely identified with them. A division of lavas is made into felspar or trachyte, augite or basaltic, and leucite lavas. The first are, in fact, nothing else than trachyte and basalt, which, in more modern times, have been poured forth as lava streams. The expression *lava* denotes not any particular kind of mineral, but only the easily known volcanic forms of various kinds of stones. In the hollows of lava and on its surface crystalline minerals occur.

LAVAL, a town of France, capital of the department and on an acclivity washed by the river Mayenne, 154 miles W.S.W. of Paris. It is surrounded by a chain of mural forts in a dilapidated state, and is very poorly built, consisting of piles of old houses huddled together in dark, narrow, winding, and almost precipitous streets. Among its principal edifices are Trinity Church, a Gothic structure on the site of a temple of Jupiter; the church of the Cordeliers, with a painted wooden ceiling, and a high altar supported by thirty-six pillars of red and black marble; a communal college, and the remains of an ancient castle, with a lofty keep, occasionally used as a jail. The manufactures consist of damasks, calicoes, bombasines, serges, flannels, and green soap; and the trade includes, in addition to these, clover, wine, brandy, wood, iron, and marble. Pop. 29,889.

LA VALLIÈRE, Louise Françoise de la Baume le Blanc de, the celebrated mistress of Louis XIV., was born in Touraine in 1644. She was descended from an ancient and noble family, and was maid of honour to the Duchess of Orleans. In 1661 she was brought to court by her mother, and for two years she cherished a secret passion for Louis, who finally noticed her. She was by no means a beauty, and was, besides, slightly lame; but her manners were amiable and winning, and her sweet and tender disposition rendered her irresistibly attractive. What is still more extraordinary, notwithstanding her equivocal position, she possessed extreme, indeed morbid, delicacy and modesty. She bore Louis four children, but was always painfully sensible of the disgrace of their birth. Two of them died in infancy. The king raised the estate of Vaujour and the barony of St. Christophe to a duchy and a peerage in favour of her and her children. When she was superseded in the affections of Louis by Madame de Montespan she retired into the Carmelite convent in the suburb of St. Jacques, where she took the veil 3d June, 1675, and where she died 6th June, 1710. She is considered the author of a work entitled Réflexions sur la Miséricorde de Dieu (Paris, 1680), a copy of which, dated 1688, with corrections by Bossuet, was discovered in the Louvre in 1852. A collection of her letters was published in 1767. Madame de Genlis wrote a historical romance founded on the events of her life, and Lebrun executed a penitent Magdalene, of which the face is from her portrait.

LAVATER, Johann Caspar, was born 15th November, 1741, at Zürich, in Switzerland, where his father enjoyed the reputation of a skilful physician. He was endowed with a lively imagination, and early gave himself up to solitary reveries. While yet at school he was persuaded that he had received direct answers to his prayers. His imagination, even at that early period, appears to have been so actively employed that he never acquired much knowledge of philology or classical antiquity. In 1763 he travelled, in company with Füseli, the subsequently distinguished painter, to Leipzig and Berlin, and became acquainted with the scholars and theologians of Northern Germany. In 1764 he returned to his native city, and in 1767 appeared as a poet in his Schweizerlieder, which, as well as his Aussichten in die Ewigkeit (1768), gained him many admirers. In 1769 he was made deacon at the orphan church at Zürich, and became first pastor in 1774. His sermons were rendered attractive by their pleasing style, his enthusiastic zeal, and a certain mysticism which always characterized him. They were printed in 1772, and were admired even in foreign countries. All his activity was, in fact, devoted to the service of religion, until he undertook his work on physiognomy. Lavater had become acquainted with a great number of persons, and his lively imagination had led him to the conclusion that there exists a much closer connection between the internal man and the external expression in the face than is generally supposed. He reduced this external expression of disposition and character to a system, and considered the lines of the countenance as sure indications of the temper. He had adopted this idea in 1769, and collected the features of distinguished people from all parts of the world. His great work (in four vols. 4to), under the modest title Physiognomical Fragments (1775 et seq.), made him known all over Europe. It was rendered valuable by the many portraits it contained, mostly well executed by some of the engravers of Germany. Lavater had added explanations, in a poetical style, full of enthusiastic exclamations. As may easily be imagined, a theory so novel found warm admirers, whose zeal often rendered it ridiculous. Lavater himself seems latterly to have given up his theory in a great degree. He published several other works, including poems and works of religious instruction, and his reputation became so great that his journeys resembled triumphs. In 1786 he became pastor of St. Peter's Church in Zürich. The beginning of the French revolution filled him with pleasure; but the execution of the king produced a violent and permanent revulsion of feeling. Hence, when the revolution appeared in Switzerland, he spoke with boldness against the new order of things, the Swiss directory, &c., and was finally transported to Basel in the year 1799. He was soon set at liberty, but on the capture of Zürich (in September 26, 1799) by Masséna, while occupied in the street assisting the distressed and giving refreshment to exhausted soldiers, he received a shot in his side. He lingered above a year, during which he wrote several works, and died January 2, 1801. Lavater was one of the most virtuous and even saintly of men. His work on physiognomy has been several times translated into English. Of the English translations we may mention Hunter's (London, 1789, five vols. 4to). A valuable French edition appeared in 1809 (Paris, ten vols.)

LAVAUR, a town of France, in the department of Tarn, on the right bank of the Agout, here crossed by a handsome bridge, 23 miles south-west of Alby. It is the entrepôt for the silks of Upper Languedoc, which are spun here for Nismes and Lyons; and had a castle which, having afforded a refuge to the persecuted Albigenses, was stormed by Simon de Montfort in 1211, at the head of a horde of fanatics, and became the scene of horrible atrocities. Pop. 6929.

LAVENDER (*Lavandula*), of the nat. order Labiatæ, a delightfully fragrant plant, is a native of the south of Europe. All the labiate plants are aromatic and stimulating, but these properties are more pronounced in this plant than in any other of the tribe, especially when it grows in a warm and sunny exposure. Indeed in such situations it sometimes contains one-fourth of its weight of camphor. To the

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abundance of this plant is attributed the superiority of the honey in certain parts of Europe. The volatile oil, distilled water, and tincture of lavender are much employed in officinal preparations, and as perfumes. The flowers yield by far the greatest proportion of oil. The plant is pretty extensively cultivated in England for the sake of the oil, there being about five hundred acres devoted to its culture in the neighbourhood of London. The oil is not used as a perfume in its natural state; it has first to be mixed with from twenty to forty times its bulk of spirits, together with a very minute quantity of neroli or other essential oil. Enough oil is produced annually in England to make 30,000 gallons of lavender water. Broad-leaved Lavender (*Lavandula latifolia* or *spica*) yields the oil known as *oil of spike*, used by painters on porcelain, and also in the preparation of varnishes.

LAVENDER, Oil of. This oil is got by distilling the flowers of *Lavandula vera* with water. It has a pale yellow colour, a characteristic aromatic odour, and a hot taste. The dry flowers yield barely 1½ per cent.; a larger quantity is obtained if the leaves and stalks be also used, but the odour is not so fine. It has a specific gravity of 0·87 or a little higher. The exact composition is not accurately known, but it contains a body analogous to camphor, and oils boiling at different temperatures. It is used in medicine as a stimulant, in hysteria, in colic, and other affections. It is also employed for its odour. In large doses oil of lavender acts as a poison. *Spirit of lavender* is prepared by digesting fresh or dry lavender flowers in rectified spirit, and distilling. It is more readily prepared by adding a few drops of the oil to the rectified spirit. The *compound tincture of lavender*, or *lavender drops*, is prepared by digesting cinnamon, nutmeg, and red sanders-wood in spirit for some days, and then adding to the strained extract oil of lavender and oil of rosemary. Cloves are sometimes added. This is much used as a stomachic against flatulence and faintness. *Lavender water* is a solution of oil of lavender in spirit, along with otto of roses, bergamot, musk, cloves, rosemary, and other ingredients, which after standing for some time is strained and mixed with a certain proportion of distilled water. It is principally used as a perfume.

LAVOISIER, Antoine Laurent, a celebrated French chemist, whose name is connected with the antiphlogistic theory of chemistry, to the reception of which he contributed by his writings and discoveries. He was born at Paris, August 16, 1743, and was the son of opulent parents, who gave him a good education. He acquired an intimate knowledge of the physical sciences, and first distinguished himself by a prize memoir on the best method of lighting the streets. Two years after, in 1768, he was chosen a member of the Academy. About this time he published several tracts, in periodical works, on the analysis of gypsum, the crystallization of salt, the congelation of water, on thunder, the aurora borealis, &c. Journeys to different parts of France furnished him materials for a mineralogical chart of the kingdom, intended as the basis of a work on the revolutions of the globe and the formation of the strata of the earth, outlines of which appeared in the Memoirs of the Academy for 1772 and 1787. The discoveries of Black, Cavendish, Macbride, and Priestley, relative to the nature of elastic fluids or gases, attracted the notice of Lavoisier, who entered on the same field of inquiry with all his characteristic ardour in the cause of science; and possessing the advantage of a considerable fortune, he conducted his experiments on a large scale, and obtained highly interesting results. In 1774 appeared his Opuscules chymiques, comprising a general view of what was then known relative to gaseous bodies, with several new experiments, remarkable for their ingenuity and accuracy. Priestley's discovery of what he called *dephlogisticated air*, afterwards generally termed *oxygen gas*, furnished Lavoisier with a fresh subject of research; and in 1778 he published an essay on this substance and its influence in the production of acids, developing the principle of a new chemical theory. This was further illustrated by his experiments on the composition of water, by burning together the oxygen and hydrogen gases, and by its analysis affording the same principles; and the system was completed by his theories of combustion and oxidation (see Oxygen), the decomposition of atmospheric air, his doctrine of caloric and its influence in causing the solid, liquid, and gaseous states of bodies; and the whole theory was laid before the public in his Elements of Chemistry, which appeared in 1789, and was speedily translated into English and other languages. There can be no doubt that the publication of this work had a great influence in spreading his views. Examination of it shows that it is devoted to the two subjects of combustion and acidification, and is little else than a monograph of oxygen. With remarkable lucidity he summed up in it the results of his discoveries, but he did not give by any means even a resumé of chemical facts known at that time, but this probably did not fall into his programme to accomplish. The essence of Lavoisier's system, arrived at even by himself after many trials and much indebtedness to contemporary chemists for indispensable facts and experimental data, is in his theory of combustion. According to him it is the result of a rapid combination of oxygen gas with the burning body, such as carbon, sulphur, phosphorus, lead, mercury, tin, or other metal. The product, whatever it be, is equal in weight to the original substance plus the oxygen that has combined with it; so that the calx or earthy residue, in the case of a metal, is heavier than the original metal. The opposite theory, which had been universally accepted prior to this, was based on the assumption of an inflammable principle entitled phlogiston, which was given off when the body was burned. The question of change of weight, which complicated the chemical one, was what the latter phlogistians had difficulty in meeting; but that need not be considered now.

While, however, Lavoisier's ability in these investigations, and his constancy to his views, are confessedly great, it is unfortunate that critics, especially foreigners, are not at all agreed as to his originality, and still less as to the straightforwardness of some of his dealings. This feeling has prevailed from his own even to the present day, and within the last two or three years the question has been reopened with greater animosity than ever. There are of course men of the highest standing who scorn all insinuations, and are prepared to give him the highest place among French savants, but these are guides who are not to be implicitly trusted, at least in the present case. The simple fact then is, that Lavoisier has been blamed for appropriating or claiming certain discoveries which he never really made, or the leading ideas and methods of which were already known. His first investigation upon gypsum was, it is said, anticipated by Marggraff; he seems to appropriate fixed air and latent heat, and it is reported that Dr. Black was deeply offended with the treatment he experienced at Lavoisier's hands. He says in his Elements that oxygen was discovered about the same time by Priestley, Scheele, and himself—a statement which received direct contradiction many years ago, when it was well known that Priestley showed Lavoisier how to make it; and a claim has been put up

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on his behalf for the discovery of the composition of water, although Cavendish's experiments had been described in Paris before Lavoisier's experiments. The discussion of such subjects, involving some of the most important discoveries in the whole of chemical history, would be out of place here, but they are now mentioned to show what difficulties have to be met and removed by the biographers of this man. It has been already said that there are distinguished men who entirely support Lavoisier, but these hardly encounter the difficulties. On the other hand are critics who, contrasting Lavoisier with his contemporaries, with Scheele and Priestley, insist upon his inability to have made a single chemical discovery, and point out that his experiments were always of a physical rather than of a chemical character, and that he not unfrequently came to a halt in the elaboration of his theories for want of a chemical fact, which sooner or later was discovered by some chemist, when Lavoisier once more proceeded with his theory. How far this is true can only be ascertained from the evidence, but much also depends upon the critic's tone of mind. To ascertain the facts some assistance may be derived from the collected edition of Lavoisier's works (Paris, 1867, 4to), of which four volumes have already appeared. Lavoisier, however, rendered many services to the arts and sciences, both in a public and private capacity. When the new system of weights and measures was brought forward he contributed to its improvement by some novel experiments on the expansion of metals. He was consulted by the national convention as to the best method of manufacturing assignats, and securing them from being forged. In 1791 the committee of the constituent assembly applied to him for information preparatory to the adoption of an improved system of taxation, in consequence of which he drew up a work which was published under the title of Richesses territoriales de la France, relating to the production and consumption of the country. About this time he was appointed one of the commissioners of the national treasury—an office which afforded him an opportunity of exercising his spirit of systematic arrangement. His house became a vast laboratory; the most skilful artists were employed to construct the necessary instruments and apparatus for his philosophical researches. He had *conversazioni* at his house twice a week, at which were discussed the theories, opinions, and discoveries of learned contemporaries. With other farmers-general he was condemned to death by the revolutionary tribunal of Paris, on the charge of being a conspirator, and of having adulterated the tobacco with ingredients obnoxious to the health of the citizens, and on this frivolous pretext was beheaded by the guillotine, May 8, 1794. When he found his fate inevitable he petitioned for a few days' respite, in order to make some interesting and important experiments which he had in view; but this favour was denied him. M. Lavoisier married in 1771 the daughter of a farmer-general, a lady of considerable talents, who not only participated in her husband's philosophical researches, but also cultivated the arts with great success, and engraved with her own hand the plates for one of his publications. She subsequently became the wife of Count Rumford, but this union was the reverse of a happy one.

LAVORO, Terra di, a province of South Italy, bounded N. by Abruzzo Ultra and Abruzzo Citra, E. by Molise and Principato Ultra, S. by Principato Ultra and the Gulf of Naples, and W. by the Mediterranean and the Campagna di Roma; about 140 miles in length, and 33 wide where broadest. It is populous and fertile, yielding abundance of corn, wine, oil, and other productions of Italy. It is also named Caserta, from its capital; Gaëta is the principal port. Pop. (1879), 733,302.

LAW, John, of Lauriston, a celebrated financial projector, was the son of a goldsmith of Edinburgh, in which city he was born 21st April, 1671. He was bred to no profession, but became versed in accounts and was employed in those of the revenue. For the purpose of remedying the deficiency of a circulating medium, he proposed to the Scottish Parliament the establishment of a bank with paper issues to the amount of the value of all the lands in the kingdom; but this scheme was rejected. In consequence of a duel he fled from his country and visited Venice and Genoa, from which cities he was banished as a designing adventurer. He accumulated a large fortune by gambling, but failed to secure the favour of governments for his schemes of banking. At length he secured the patronage of the Duke of Orleans, regent of France, and in company with his brother William established his bank in 1716 by royal authority. It was at first composed of 1200 shares of 3000 livres each, which soon bore a premium. This bank became the office for all public receipts, and there was annexed to it a Mississippi company, which had grants of land in Louisiana, and was expected to realize immense sums by planting and commerce. In 1718 it was declared a royal bank, and the shares rose to twenty times their original value. A prodigious quantity of paper money was issued, the credit of which was unquestioned, whilst the national bonds remained at a price far below their nominal value. In 1720 Law was made a councillor of state and comptroller-general of the finances; but the shares sank in value as rapidly as they had risen. He was obliged to resign his post, after he had held it only five months, and to retire, first to a seat in the country, and then for personal safety to quit the kingdom. He carried with him a small portion only of the vast fortune he at one time possessed, and lived afterwards in great obscurity. After visiting Britain, Holland, Germany, and other countries, he finally settled at Venice, where he eked out a wretched living by gambling, and died in May, 1729, still occupied in vast schemes, and fully convinced of the solidity of his system, the failure of which he attributed entirely to enmity and panic. Various opinions have been entertained of the merit of his project, and by some it has been thought to have possessed feasibility, had it been carried more moderately into practice. A volume entitled Œuvres de J. Law was published at Paris in 1790, 8vo.

LAW, Physical, the expression of the connection observed between the circumstances of kindred phenomena in the material world. When the general law of a class of phenomena is known, any new phenomenon is said to be explained, or accounted for, or traced to its cause, when we show that it is contained in the enunciation of the known law. A *physical theory* is merely the rational development of the consequences of a physical law, so that it is made to explain phenomena which had not seemed to be kindred. There is generally some hypothesis introduced, and so long as this hypothesis seems necessary and probable, and cannot be disproved by facts, the theory is accepted by physicists.—A person recognizes a *fact* by unconsciously interpreting his sensations (his seeing, hearing, &c.) according to some rule or law which experience has taught him. Thus he states as a fact that he has seen a certain person, having come to this conclusion from judgments as to his appearance, voice, &c. 'A person who has in his mind the measures of different lines and countries on the earth's surface, and who can put them together into one conception, finds that they can make no figure but a globular one: to him the earth's globular

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form is a fact as much as the square form of his chamber.' (See Whewell's Hist. of Scient. Ideas.) Theories and facts cannot be separated by a distinct line of division. What is a theory to one man becomes a fact to another, whose habits of thought and previous experience enable him to recognize it as a fact. Mathematics is the logical deduction of truths from ideas which seem to be inherent in man. However complex a mathematical law may be, it must have been included in the general definitions and axioms with which we started. In physics, on the contrary, we draw general conclusions from the observation of individual instances of the occurrence of a phenomenon, such conclusions depending for their validity on the universality of the law of causation. But for the liability to error of observation incidental to all human experiments, a physical law may in some cases be established with rigorous certainty by the examination of a single instance; while in other cases a large number of instances may furnish us with the means of arriving only at a more or less probable conclusion. See LOGIC, INDUCTIVE.

LAW, WILLIAM, a divine of the Church of England, born at Kingscliffe, in Northamptonshire, in 1686, educated at Emanuel College, Cambridge, where he was elected fellow in 1711, and took his degree of M.A. in 1712. On the accession of George I., refusing to take the oaths, he vacated his fellowship and left the university. He then officiated as a curate in London, and as tutor to Edward Gibbon, father of the historian. Mrs. Hester Gibbon, aunt of the same eminent individual, and Mrs. Elizabeth Hutcheson, widow of a London barrister, formed a joint establishment, of which he became a member, at his native village of Kingscliffe, where he died 9th April, 1761. The writings of Law, although in many respects excellent, partake of a gloominess and severity, tinged with a mysticism and enthusiasm, that the study of the writings of Jacob Boehme did not fail to increase. The Serious Call to a Devout and Holy Life (1729) is deemed both by Dr. Johnson and Gibbon one of the most powerful works of devotion in the English language. His Treatise of Christian Perfection abounds with satire, spirit, and knowledge of life. He also wrote some other works, and published translations of his favourite Boehme. A collective edition of his works—consisting principally of controversial tracts against Hoadly, Mandeville, Trapp, and Warburton, and theological treatises—was published in 1762, nine vols. 8vo. (See his Life by Tighe, and Gibbon's Memoirs of himself.)

LAWBURROWS, LETTERS OF, in Scotch law, a writ running in the sovereign's name, and obtained at the instance of one who apprehends danger to his person or property from another, who must give security that he will offer no violence to the person at whose instance the letters are issued, or to those depending on him, under a penalty fixed by the act 1593, cap. clxvi. The person applying for or issuing the letters must bring proof of his cause of alarm, or swear that he apprehends violence. The person against whom the letters are directed must find caution, within the days specified in the letters, to the extent required. If the letters are taken out maliciously and without probable cause, they may be suspended, and damages awarded. If caution is not found within the time specified, the person who has been guilty of the neglect may be imprisoned. If the person who has found caution shall do any violence to the complainer or his dependants, there arises an action of contravention of lawburrows, and decree will be given against both the offender and cautioner.

LAW MERCHANT. See COMMERCIAL LAW.

LAW OF NATIONS. See NATIONS, LAW OF.

LAWRENCE, a town of the United States, in Essex county, Massachusetts, on both sides of the Merrimack river, 26 miles north from Boston. The principal buildings are the courthouse, state university, opera-house, &c. It is principally supported by its extensive cotton and woollen factories, for which water-power has been obtained by means of a granite dam across the Merrimack. There are also large paper-mills, and manufactures of steam-engines, sewing-machines, carriages, &c. Pop. in 1880, 39,178.

LAWRENCE, St., a Roman deacon and martyr, who, when his bishop, Sixtus II., was led to death in the persecution of Valerian, cried out, 'Whither dost thou go, father, without thy son!' The bishop ordered him to remain, and to take care of the treasures of the church; but he was arrested and ordered to give up these treasures. He asked for three days' respite, during which he called together all the poor and sick, whom he showed to the satellites of the emperor as those whose support secured treasure in heaven. He is said to have been burned to death on a gridiron in 258. His day in the Catholic Church is August 10.

LAWRENCE, St. This river, one of the largest in the world, rises under the name of the St. Louis, and is the outlet by which the waters of the great lakes, Superior, Huron, Michigan, Erie, and Ontario are poured into the ocean through the Gulf of St. Lawrence. In different parts of its course it is known by different names. From the sea to Lake Ontario it is called *St. Lawrence;* between Lakes Ontario and Erie it is called *Niagara* river; between Lakes Erie and St. Clair, *Detroit* river; between Lakes St. Clair and Huron, *St. Clair's* river; between Lakes Huron and Superior, *St. Mary's* river or the *Narrows*, forming thus an uninterrupted connection of upwards of 2000 miles. It receives the Ottawa, its principal auxiliary, the St. Maurice, and numerous other large streams from the north, but none of any magnitude from the south. The river is navigable for Atlantic steamers and other large sea-going vessels up to the city of Montreal 600 miles up. The distance from Montreal to Lake Ontario is about 200 miles, and between these there are various rapids which can be entirely avoided by means of a series of canals on the British side. The tide flows up as far as Three Rivers. Its breadth between Montreal and Quebec is from ½ mile to 4 miles; the average breadth, about 2 miles. Below Quebec it gradually widens till it enters the gulf, where, from Cape Rosier to the Mingan settlement on the Labrador coast, it is about 105 miles in breadth. The river in several places spreads out into large lakes, such as Lake St. Francis, St. Louis, and Deux Montagnes; and there are numerous islands, shoals, and rapids. From the beginning of December to the middle of April the navigation is totally suspended by frost. The breaking-up of the ice in the spring is described as a magnificent scene. In part of its course it forms the boundary between the United States and Canada.

LAWRENCE, GULF OF ST., a large inlet of the North Atlantic in British North America, inclosed by the island of Newfoundland on the east, Nova Scotia, New Brunswick, and Canada on the south and west, and Labrador on the north. It communicates with the ocean by the opening betwixt Newfoundland and Cape Breton, about 65 miles wide, by the Strait of Belleisle and the Gut of Canso. On the north-west it receives the estuary of the St. Lawrence. It contains numerous islands, the principal of which are Anticosti, Prince Edward's, and the Magdalen.

LAWRENCE, JOHN LAIRD MAIR, LORD, an eminent member of the Indian civil service, and ultimately Governor-general of India, born in Yorkshire, March 4, 1811; died in London June 27, 1879.

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After passing through the East India college of Haileybury, he went out to India in 1829. Having attracted the attention of the governor-general, Sir H. Hardinge, by the administrative ability he displayed while acting as magistrate and collector in the central district of the Delhi territory, he was appointed commissioner of the Trans-Sutlej provinces added to the Indian empire after the first Sikh war of 1845-46. By his conduct in this post he raised his reputation for administrative capacity still higher, and after the conclusion of the second Sikh war in 1849, he was appointed, along with his brother Sir Henry Lawrence, member of the board of three intrusted with the administration of the Punjab, which was then annexed to British India. In 1853 he was appointed chief-commissioner of the Punjab, and the services which he rendered to our Indian empire during his tenure of this office were of the first consequence and contributed in no small degree to the salvation of the empire at the time of the mutiny in 1857. At the time of the annexation of the Punjab no part of the population of India was more bitterly hostile to the British than the Sikhs, and nowhere in India was the government more corrupt, but by the wise measures he adopted to establish order and settled government in the province, and by the justice and firmness he displayed as head of the administration, he gained so much influence with the Sikhs that when the mutiny broke out Lawrence was able to rely so much on their fidelity as to draw from them bodies of troops to assist in quelling the revolt; and it was largely owing to the energy that he showed in collecting these forces that Delhi was captured at so early a stage of the mutiny. He was rewarded for his services at this crisis by having a succession of honours bestowed upon him. Already a K.C.B., he was in 1857 raised to the dignity of G.C.B; in 1858 he was created a baronet, and he was made a knight of the Star of India on the institution of that order. In Dec. 1863, he succeeded Lord Elgin as Governor-general of India, and held that office till 1868. After his return to England he was raised to the house of peers under the title of Baron Lawrence of the Punjab and of Grately in the county of Southampton. At the election of the first School Board of London in 1870, he was returned for the division of Chelsea, and he acted as the first chairman of the board. His last public efforts were directed against the policy of seeking to extend our Indian empire in the direction of Afghanistan.

LAWRENCE, Sir Henry Montgomery, an eminent British officer, was born at Mattura, Ceylon, on 28th June, 1806, and was a younger son of Lieutenant-colonel Alexander William Lawrence, who distinguished himself in the war with Tippoo Saib. Having obtained a cadetship in the Bengal artillery he studied at the military college of Addiscombe in Surrey, and proceeded to India in 1821, and rose steadily in rank. He served under Sir George Pollock in the Afghan campaign of 1843, attained the rank of major, and was appointed British resident at Catmandoo. He distinguished himself in the Sutlej campaigns, and acted from 1846 to 1849 as agent for the governor-general on the north-west frontier, and resident at Lahore. For these last services he was made a K.C.B. He subsequently officiated as president of the board of administration of the Punjab, and from 1852 to 1857 was agent in Rajputana. On the annexation of Oude to British India he accepted the offer of chief commissioner of the territory, and arrived at Lucknow shortly before the commencement of the Indian mutiny, and on its outbreak was invested with full powers as commander-in-chief in Oude and a commission as brigadier-general. The memorable defence of the residency was conducted by him up to 2d July, 1857, when he was mortally wounded by a shell that entered a room in which he was sitting, and died two days afterwards. Sir Henry Lawrence is the author of Adventures of an Officer in Runjeet Singh's Service, and of various military and political essays originally published in the Calcutta Review.

LAWRENCE, Sir Thomas, a distinguished English portrait-painter, was born at Bristol, May 4th, 1769. His father was an innkeeper, and the artist very early exhibited proofs of his talent for the art; he is said to have sketched portraits very successfully in his fifth year. At the age of six he was sent to school, where he remained two years; and this, with the exception of a few lessons subsequently in Latin and French, constituted his whole education. Young Lawrence, however, had access to the galleries of some of the neighbouring gentry, in which he employed himself in copying historical and other pieces, and at the age of ten he had full employment as a painter of portraits in crayons. In 1787 the family removed to London, and Lawrence was admitted a student at the Royal Academy. His subsequent career was successful and brilliant. He was elected in 1791 a Supplemental Associate by the desire of the king, being under the age (twenty-four) fixed by the laws of the institution. No other case of the kind has occurred. On the death of Sir J. Reynolds the next year he was made painter to the king. His reputation grew steadily, and he was soon considered the first portrait-painter of the age in England. His scene from the Tempest was a successful attempt at historical painting. In 1798 he was made a Royal Academician. In 1815 he was knighted by the Prince Regent, who also employed him to take the likenesses of the allied sovereigns and the most distinguished persons of their suite. During their visit to England he finished the portrait of the King of Prussia, and went to Aix-la-Chapelle several years afterwards to paint the Emperor Alexander; thence he went to Vienna, where he completed the portraits of the emperor, the archdukes, Metternich, &c., and in Rome painted Pius VII. and Cardinal Gonsalvi. These portraits are now in the Waterloo Gallery at Windsor, and are of great historical value. On his return to England he was elected President of the Royal Academy, as successor to West. This office he held till his death, which occurred suddenly, Jan. 7, 1830. His portraits are striking likenesses, and display a bold and free pencil; but they are, particularly his later ones, chargeable with mannerism, and are not considered to be successful in expressing the nicer shades of character. His income for the last twenty years of his life was from £10,000 to £20,000; but he died poor, owing to the lavishness with which he spent money in acquiring the first-rate productions of his art, in assisting less fortunate artists, and in other ways. His valuable and unrivalled collection of drawings by the old masters was unfortunately dispersed after his death.

LAWRENCE, Sir William, an eminent surgeon and anatomist, born at Cirencester, 16th July, 1783. He received his early education at a private school, and in 1790 was apprenticed to the celebrated Abernethy, and was an inmate of his house for five years. In the third year of his apprenticeship he had given such proofs of his zeal and capacity that Abernethy appointed him demonstrator in anatomy at St. Bartholomew's, and for twelve years he discharged the duties of his office with signal ability. In 1824 he became principal surgeon to St. Bartholomew's Hospital, the office of surgeon to which he had filled from 1813. Within two years from this date he had discharged successively the duties of surgeon to the Eye Infirmary in Moorfields, and surgeon to the Royal Hospitals of Bridewell and Bethlehem. In 1816 he published an Introduction to Comparative Anatomy

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and Physiology, and in 1819, Lectures on the Physiology, Zoology, and Natural History of Man. The popular and pleasing style in which these lectures were written, as well as the boldness and originality of the views expressed in them, excited much attention, provoked the hostile criticism of theologians, and involved their author in angry controversies with his professional brethren. His attempt to place physiology on the basis of the other inductive sciences was only in part successful, for the generalizations were not in every case supported by facts, and he afterwards modified or retracted many of his views. In 1827 he published a translation of Blumenbach's Comparative Anatomy, but the increasing burden of his official labours prevented him from prosecuting further his cultivation of the natural sciences, and his subsequent works were devoted entirely to professional subjects. In 1828–29 he succeeded Abernethy as lecturer on surgery to St. Bartholomew's, and distinguished himself by his fearless advocacy of medical reform. In numerous trenchant articles in the Lancet he exposed and denounced the corrupt system of appointment then prevalent in the London hospitals, and a purer system of election has been the consequence. His professional reputation and his position as a practitioner advanced steadily, and he enriched surgical literature by many valuable works. He received a baronetcy on the occasion of his appointment to succeed Sir Benjamin Brodie as sergeant-surgeon to the queen. Few men have done more to advance surgical science in this century, and he was not the least eminent of that distinguished band of surgeons which includes Cline, Abernethy, Brodie, Astley Cooper, and Liston. He died 5th July, 1867, having nearly completed his eighty-fourth year. His treatise on Hernia (1807) is a standard work, and the publication of that on the Diseases of the Eye marks an epoch in ophthalmic surgery. His lectures on surgery were published in 1863, when he was in his eightieth year. He was twice president of the Royal College of Surgeons, and on two occasions, in 1834 and 1846, he delivered the Hunterian Oration. Beyond the limits of his profession he was a diligent student, and as a lecturer he was without a rival in his own domain. He was a foreign associate of the Institute of France, and a member of many foreign scientific and philosophical societies.

LAWSON'S CYPRESS (*Cupressus Lawsoniana*), a species of cypress introduced into Great Britain from North America in 1854. It is found in the valleys of Northern California, where it grows to the height of 100 feet. This cypress is perfectly hardy in our climate, and the wood promises to be useful and profitable. It grows rapidly, is easily propagated, and seeds freely, producing cones in abundance. It is a handsome ornamental tree, with something of the aspect of the arbor-vitæ, and is becoming quite a favourite. The branches are numerous, and well clothed with foliage; the leading annual shoots and branchlets are drooping, slender, and regularly disposed, forming symmetrical pyramids of rich green spray or graceful pillars of plumes and feathers.

LAW-TERMS. See TERMS.

LAWYER, a term commonly applied to all persons learned in the law and connected with its administration, comprehending attorneys, solicitors, barristers, advocates, &c. In Great Britain lawyers are divided into great classes—the barristers, advocates, or counsel, whose office it is to 'plead' for their clients, they being alone entitled to do so in all the higher courts; and the attorneys or solicitors, who prepare causes for the barristers, though they are also allowed to plead in certain inferior courts.

LAYAMON, also called LAWEMAN, author of the Brut, a metrical chronicle of Britain from the arrival of Brutus to the death of King Cadwalader in A.D. 689, flourished soon after 1200 A.D. From his own account he was a priest, and resided at Ernley, near Radstone, or Redstone, now Lower Arley, on the Severn, in Worcestershire, where he seems to have been employed in the services of the church. Layamon's Brut is mainly an amplified translation of the French Brut d'Angleterre of Wace, itself merely a translation with additions from Geoffrey of Monmouth's Historia Britonum, and that again confessedly a translation from a Welsh or Breton original. Layamon's version appears to have been completed in the first years of the thirteenth century. Its value is chiefly linguistic. Warton and Tyrwhitt merely mentioned its existence; Ellis gave an extract of considerable length with annotations; and the whole work was edited for the London Society of Antiquaries in 1847 by Sir Frederick Madden, in three vols. This edition contains the poem in two texts, accompanied by a literal translation, notes, and a glossary, and is of great philological value. Layamon's English was that of North Worcestershire, and belongs according to the editor 'to that transition period in which the groundwork of Anglo-Saxon phraseology and grammar still existed, although gradually yielding to the influence of popular forms of speech.' It exhibits marked symptoms of a language in a state of change, and enables us to trace the process by which the Anglo-Saxon was gradually transformed into the English of Chaucer. Only a very small amount of the French or Latin element is found in the Brut, while it forms a very marked feature of the Canterbury Tales. Not so many as ninety words derived from the French occur in both texts, which together contain more than 56,800 lines; so that even as late as the middle of the thirteenth century English was really little affected by foreign intermixtures. Layamon's versification is entirely arbitrary. The alliterative system of the Anglo-Saxon is preserved in lines, while rhyming couplets of unequal length, after the French fashion, are found not unfrequently. Some couplets have both forms, and some possess neither. On the whole alliteration predominates over rhyme, and where neither occurs the lines must have depended entirely on accentuation, or have been incorrectly transcribed.

LAYBACH. See LAIBACH.

LAY BROTHERS are an inferior class of monks employed as servants in monasteries. Though not in holy orders they are bound by the three monastic vows of poverty, chastity, and obedience. They appear to have been first introduced into convents of monks in the eleventh century. They are employed in those manual labours necessary for the uses and comfort of the community with which they are connected, and wear a dress somewhat different from that of the other monks, or *brothers of the choir*. This distinction is said to have been first recognized by the monks of the Carthusian and Cistercian orders, whose example was speedily imitated by the other orders. In nunneries a similar distinction prevails between the nuns proper and the lay sisters, who are also called *sisters converse*.

LAYERING, in horticulture, is a mode of propagating plants by surrounding the base of a young branch with earth, and thus causing it to shoot forth roots before it is separated from the parent stock. The portion covered with soil is fractured by twisting or bruising, or cut with a knife immediately under a bud. Instead of cutting a tight ligature is sometimes applied. The free return of the sap is thus prevented, and the formation of roots promoted from the effort of nature to perpetuate life. These roots are buds which, because they are immersed in earth, are elongated into slender radicular fibres; whereas,

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were they left in the air, they would be developed into young scions. The time which must elapse between the cutting or binding of the shoot and its separation from the parent plant varies greatly, a few months sufficing in some cases, while two years are requisite in others. This mode of propagation is employed for pinks, hortensias, heaths, gooseberries, &c.

LAYNEZ, JACOBO, the second general of the Jesuits, and the real founder of the policy and organization of the society, was born at Almançario, near Siguenza, in Castile, in 1512. He studied at Alcala, where he received the degree of Master in Arts. The fame of Ignatius Loyola's religious zeal, and the desire of becoming acquainted with him, and at the same time of pursuing his own studies, led Laynez to Paris, where Loyola was then residing, in order to escape the persecution of the Inquisition. An intimacy was soon formed between these two zealots, and they determined to go to Turkey, and preach the gospel to the infidels. A war with the Porte defeated this plan; and while at Venice in 1536 they formed the project of establishing a society, the principal aim of which should be the education of the people in the doctrines of the Roman Church, and the prevention of the spread of the new opinions. Laynez, more prudent, learned, refined, and dexterous than Loyola, had a principal share in the formation of this plan, and his disinterestedness, his zeal, and activity were among the main causes of the success of the new institution. However, a greater share in the constitution of the society has been ascribed to Laynez than is due to him, the claims of Francis Xavier having been unaccountably ignored. After the order had been confirmed by Paul III. (1540), and Loyola, at the request of Laynez, had been appointed the first general, he made many journeys for the purpose of extending the society of the Jesuits, and exerted himself with great activity in the cause of the pope, whose theologian he was at the Council of Trent. He refused the cardinal's hat which was offered him by Paul IV. In 1558 he succeeded Loyola as general of the order. On the death of Paul IV. in 1559 twelve cardinals were in favour of raising him to the pontificate, but he withdrew from Rome to avoid being elected. In 1561 he went to France with the Cardinal Ferrara to assist him in extirpating heresy, and he was the only one at the notorious conference of Poissy who listened at all to the voice of reason and mercy. But his moderate and pacific views were not adopted. The establishment of the Jesuits in France, although with some restrictions, was the result of this journey. After Laynez had assisted in establishing, at the third Council of Trent, the supremacy of the Bishop of Rome over the other bishops, he returned to Rome, where he devoted himself to the direction and extension of his order. He died there January 19, 1565, at the age of fifty-three.

LAZARETTO, a public building, hospital, or pest-house, for the reception of those afflicted with contagious distempers. It is more particularly applied to buildings in which quarantine is performed. Only those are admitted who have arrived from countries infested by the plague or other contagious disorder. See QUARANTINE.

LAZARISTS, or FATHERS OF ST. LAZARUS, in France. The priests of the mission were so called after their priory of St. Lazarus in Paris. This order, consisting of regular priests bound by complete monastic vows, was founded at Paris by St. Vincent de Paul in 1625 for the purpose of supporting missions and of ministering to the spiritual wants of the poor; but in pagan countries they have effected less than other orders established for the same purpose. The foundation was confirmed by letters-patent of Louis XIII., May, 1627, and the missionaries were erected into a congregation by Pope Urban VIII. in 1631. In China they have still a mission. In France they were dispersed at the revolution, but in 1816 were restored by a royal ordinance to their original destination, on account of their services in the care of the country people. In 1817 they were established in the United States. Before July, 1830, they distinguished themselves as the most active missionaries, adherents, and informers in the service of the ultra party, by means of which party a portion of their former estates was restored to them. In Poland, where they are called *fathers of the mission*, they are most numerous, and have great influence as teachers in the seminaries and as spiritual censors. The congregation has houses in all quarters of the world.

LAZULITE. This mineral, which is not to be confused with lapis lazuli, is found in Styria, Gratz, Upper Valais, in Sweden, in Brazil, and in the United States. It occurs massive, and also well crystallized in forms belonging to the monoclinic system. It has a fine blue colour and vitreous lustre, and is semi-translucent. It is moderately hard, but brittle; specific gravity, 3·1. It is a hydrated phosphate of aluminium, iron, and magnesium, but it also contains lime, and sometimes silica and manganese. Its composition is phosphoric anhydride, 40·9—47·7; alumina, 27·48—36·22; ferrous oxide, 1·9—10·6; magnesia, 8·5—13·5; water, 5·3—6·9. When heated it loses water and becomes white and infusible.

LAZZARONI, a class of persons in Naples (formerly about 40,000) without employment or home, and having no settled means of support, the greatest part of them living for the whole year, both day and night, in the streets and public places. The name is said to be derived from that of Lazarus in the parable, though it is more directly connected with the hospital of St. Lazarus, which served as a refuge for the destitute of the city. The patients, principally persons of the lowest class, after leaving it retained their wretched clothes, and were hence called *lazzaroni*. The extreme fruitfulness of the soil, which renders subsistence very easy; the extraordinary temperance of the inhabitants; the warmth of the climate, and the indolence which it produces, gave rise to this class of men. The small moneys needed to buy food they easily picked up in the capacity of messengers, porters, and day-labourers, without hard work. The desire of property and of more of the comforts of life, with more industrious habits, was first introduced among these people in modern times under the reign of Joseph Bonaparte, when they were employed in making excavations, &c., and received part of their pay in domestic utensils and furniture, that they might become accustomed to a home. They were also collected in villages, where it was intended to educate their children. The police regulations of King Joachim (Murat) also contributed to improve their condition. For a long time they played an important part in all Neapolitan revolutions, and under Masaniello accomplished the revolt of July 7, 1647, against the Duke d'Arcos. In recent times they allied themselves to the cause of despotism. They are now no longer a separate class, though the name is still applied to the boatmen and fishermen of the city.

LEAD (Greek, *molibos, molybdos;* Latin, *plumbum*). This metal was well known to the ancients. It was used by the Egyptians and other nations of antiquity for making glass and enamels; the metal itself was used in buildings, and for many purposes for which it is well suited by its specific gravity, softness, and permanence; remains of the workings of lead mines

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of the time of the Romans are found in Spain and other parts of the Continent, and in Britain ingots of lead have been got with Latin inscriptions. Homer alludes to the practice of putting leaden balls at the end of fishing-lines. The custom of writing on lead mounts also into very great antiquity. Frontinus and Dio Cassius assure us that the consul Hirtius, besieged in Modena, wrote upon a leaf of lead respecting his situation to Decius Brutus, who replied by the same means. Pausanias speaks of certain books of Hesiod written upon sheets of lead; and if we may believe Pliny, even public acts were consigned to volumes or leaves of the same material. The poets make frequent allusion to leaden coins. Ficorini, in his Piombi Antichi, has collected and represented a vast number of monuments of this kind. Caylus conceived them to be all Roman; and thus, according to that writer, those even which represent Egyptian divinities, or are inscribed with Greek characters, are yet to be referred to the times of the Roman emperors. Statues of lead are very rare. In the middle ages lead and its compounds were much used; red and white lead, litharge, sugar of lead, were known to the artists, apothecaries, and chemists, and lead itself plays an important part in the theories and practice of the alchemists, it being one of the metals which it was most frequently attempted to transmute into gold.

Lead is an abundant and widely distributed metal. It is a constituent of a very large number of minerals, all of which could be used as sources of it, if they could be obtained in sufficient quantity. In practice the metal is got from only a few of these minerals, especially from the sulphide, carbonate, and one or two others.

Ores of Lead.—1. The most important of all the ores of lead is the *sulphide* or *lead glance*, which has been described under the term Galena. In order to ascertain the value of a sample of this ore, it may be analyzed in two ways. The *dry* assay is performed by separating a portion of it as perfectly as possible from the matrix or gangue, pulverizing it, mixing it with iron in small pieces (small tacks, for example), carbonate of sodium and borax, introducing the mixture into a Hessian crucible, which, being placed within a second one, is to be exposed to the heat of a wind-furnace, or of an ordinary forge, during fifteen minutes; it is then removed, suffered to cool, and broken: a button of lead occupies the bottom of the crucible, which, on being weighed, makes known the richness of the ore. If the amount of silver require also to be known the button is heated on a cupel in a muffle till the lead is wholly oxidized, and the silver globule which remains is carefully cleaned and weighed. The *wet* method of assaying consists in oxidizing the galena with strong nitric acid, adding dilute sulphuric acid, collecting and weighing the precipitate of sulphate of lead. If any insoluble matrix be present the precipitate should be digested with acetate of ammonium. By this reagent the sulphate of lead is dissolved and the matrix is left. The weight of this, deducted from the total weight, gives the amount of sulphate of lead.

2. *Carbonate of Lead, Cerussite*, or *Lead-spar*, so called from its prevailing colour, like all the salts of lead, is perfectly unmetallic in its appearance, and is not unfrequently rejected from among common lead ... mineral. It is both crystallized and ... als are oblique, four-sided prisms, ... ously terminated, acute, double ... abular crystals, and twin and ... cleave parallel to the sides of ... of 117° and 63°, which is the ... species. Lustre adamantine; hardness equal to that of calcareous spar; brittle; specific gravity, 6·46. It dissolves with effervescence in hydrochloric and nitric acids, yields a metallic globule on charcoal before the blowpipe, and is composed of oxide of lead 83·5, and carbonic acid 16·5. This species often occurs massive, and intermingled with earthy and metallic oxides, and is sometimes tarnished and blackened so as to be with difficulty recognized. It occurs in veins in primitive and secondary rocks, accompanying galena and other ores of lead. It is abundant in European countries, in Britain, in Ireland, and it has been found at different localities in the United States. Splendidly crystallized specimens are got from Wales, Wicklow, and Leadhills.

3. *Sulphate of Lead, Anglesite*, or *Lead Vitriol*. Its principal forms are an oblique four-sided prism, variously bevelled or truncated, and a broad, rectangular, four-sided pyramid. It admits of cleavage parallel to the planes of a right rhombic prism of 103° 42′ and 76° 18′, its primitive form; lustre shining, adamantine; fracture conchoidal; translucent; hardness that of calcareous spar; streak white; brittle; specific gravity, 6·3. It decrepitates before the blowpipe, then melts, and is soon reduced to the metallic state. Its constituents are, oxide of lead 70·5, sulphuric acid 25·75, water 2·25. It was found originally at Anglesea. Very large and perfect crystals have been got at Leadhills, at Wirksworth, and some foreign localities. The massive varieties are found in moderate amount in England, in Australia, and other countries. It is produced by the oxidation of galena.

4. Combinations of the two preceding minerals are known, and are regarded as distinct species; their names are *Lanarkite* (which see), *Leadhillite* (which see), and *Susannite* (which see). Besides these there is *Caledonite*, which is sulphate and carbonate of lead with carbonate of copper. It occurs at Leadhills, in fine orthorhombic crystals of a bluish-green colour. Its specific gravity is 6·4; it is translucent, easily reduced by the blowpipe, and partially soluble in nitric acid.

5. *Chromate of Lead, Crocoisite*, or *Crocoite*, is of a deep orange-red colour; when pulverized, orange-yellow. It occurs crystallized and massive; cleaves parallel to all the planes of an oblique rhombic prism of about 93° 30′ and 86° 30′, of which numerous modifications have been described. The cross fracture is uneven, passing into conchoidal, with a splendent lustre. It is sometimes translucent; brittle; specific gravity, 6. When exposed to the blowpipe it crackles and melts into a grayish slag, and it can be reduced to metallic lead. It consists of oxide of lead 63·93, chromic acid 36·40. It was originally found in Siberia, in a vein traversing gneiss and mica slate in the gold mine of Beresof, and in a sandstone near the same place; it has since been met with in the Philippine Islands, in Brazil, and in Hungary. It was in this mineral that *chromium* (which see) was first discovered.

6. *Molybdate of Lead* occurs crystallized in obtuse octahedrons, variously modified, and in tabular crystals. It cleaves parallel to the sides of a right square prism, its primary form; colour wax or honey yellow; lustre resinous; translucent; hardness below that of calcareous spar; brittle; fracture uneven, passing into conchoidal; specific gravity, 6·7. Before the blowpipe it decrepitates; on charcoal it fuses into a dark-gray mass, in which globules of reduced lead are visible. It consists of 60·35 oxide of lead, 39·30 molybdic acid. It occurs principally at Bleiberg in Carinthia, with other ores of lead, and at many continental localities, and in Kirkcudbrightshire Scotland.

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7. *Phosphate of Lead*, or *Pyromorphite*, occurs crystallized in the form of a six-sided prism, generally modified on the edges, and as it cleaves parallel to the sides of the hexagonal prism that figure is regarded as its primary form; colour, shades of green, yellow, and brown; translucent; lustre resinous; fracture imperfect, conchoidal, uneven; brittle; hardness equal to that of calcareous spar. Besides occurring in distinct crystals, it assumes globular, reniform, botryoidal and fruticose shapes. Before the blowpipe it melts by itself upon charcoal, and the bead exhibits, in cooling, crystalline facets. It consists of oxide of lead 78·58, phosphoric acid 19·73. In some varieties of this species arsenic acid is substituted for phosphoric acid, and in others calcic phosphate and fluoride and chloride of lead are present. Phosphate of lead is found accompanying the common ores of lead, though rarely in any considerable quantity. Finely crystallized varieties are found at Przibram in Bohemia, at Huelgoet in Brittany, at Leadhills in Scotland, and at Cornwall in England. In America it occurs at the lead mine near Freyberg in Maine.

8. *Chloride of Lead*, or *Cotunnite*, was found as a sublimate in the crater of Vesuvius after the eruption of 1822, and again in 1840 and 1855. It forms fine silky crystals belonging to the rhombic system. It is white, soft, fusible, soluble in excess of water, and has a specific gravity 5·23.

An oxychloride was found in the same locality in 1858. This is identical with the mineral Matlockite, which is found in Derbyshire. Another oxychloride with more oxygen is known as Mendipite. It is usually white, with pearly lustre, but is sometimes tinged red or blue. It is a rare mineral. No native iodide has been described, but an oxyiodide from Peru is known. It has a yellow colour, is very fusible, and dissolves completely in nitric acid and water.

Besides the preceding there occur also compounds of lead with antimony and sulphur, with arsenic, selenic, tungstic, and vanadic acids, and with selenium.

Metallurgy of Lead.—Lead is one of the most easily reducible metals, and from the native carbonate can be got by simply heating with coal or charcoal. The sulphide, however, which is the most abundant of its ores, is not so readily acted on by coal, so that it would be necessary first to roast the ore in order to convert it into oxide, and then to reduce this. By a special modification of the roasting process the use of coal as a reducing agent can be, to a great extent, dispensed with, and a considerable saving thus effected. The following is an outline of the method:—The ore is broken and hand-picked, to remove matrix and earthy impurities as far as possible; next it is crushed, ground, and washed, and then it is melted. For this purpose a reverberatory furnace is used, the hearth of which is hollowed towards the centre, and is provided with a hole for running off the metal into a receiver placed outside, and another tap-hole for the escape of the slag, while there are openings at each side for the workmen. Upon the hearth, which is at a full red heat, a charge of the ground sulphide is thrown and spread out uniformly; the air passing through the grate, which at first contains little or no fire, soon oxidizes the ore; sulphurous acid escapes, oxide and some sulphate of lead are formed; and from time to time the ore is turned over until the oxidation has gone sufficiently far. When this is done the heat is raised by increasing the fire and the draught, and then a reaction takes place between the oxide, sulphate, and unchanged sulphide of lead. Part of the sulphur of the sulphide combines with the oxygen of the oxide, thus forming sulphurous acid and metallic lead, while another part reduces the sulphate, again forming sulphurous acid. In consequence of this metallic lead is liberated, which flows into the hollow, and thence into the receiving pot outside, while the acid gases, and volatile matters are carried along a flue and up the chimney. To assist the flowing of the materials the ores are selected so as to form fluxes for each other, but a little lime is generally added to assist this part of the operation. After the flow of lead has slackened the heat is pushed still higher, and more lime is added to liberate what lead may have combined with silica or other matters, and which would thus escape reduction. An additional quantity having been thus obtained, the furnace is finally heated to the highest possible temperature, all the lead is run off, and the slags, thickened and made stiff by fresh additions of lime, are pulled out and a fresh charge is introduced into the furnace. The slags always retain a considerable proportion of metal, which is extracted by fusion in a special furnace, called a *slag hearth*, but the quality of lead so obtained is inferior. Other modes of extraction are also in use. Thus in some parts of the Continent scrap-iron is employed as the reducing agent. The workmen commence by melting the ore in a reverberatory furnace of small size, and when the bath is full, they throw in 28 per cent. of old iron. In a little time the sulphur passes from the lead to the iron, leaving the former metal free, which occupies the bottom of the basin. By this means the same quantity of ore is reduced as in the first described process, with the advantage, too, of a considerable saving of time, and with one-half of the labour; but it is attended with the complete loss of the iron, which in some districts, however, is so cheap as to be of no consideration.

Instead of a reverberatory furnace varieties of blast-furnace are used in different localities. The ore is first completely roasted—an operation which takes a considerable time—and is chilled in water. It is then transferred to the smelting-furnace, where it is heated with peat, coal, or other convenient fuel, the combustion being kept up by a blast of air. Care has to be exercised in this operation that the slags are in proper condition, and that the temperature, while sufficiently high to melt the lead, does not fuse antimony or other metals present in the ore. If successful the lead obtained is pure and soft. In connection with this blast-furnace there are generally flues or chambers, sometimes of great length, in which the volatile particles, consisting of compounds of lead, arsenic, antimony, &c., are condensed. These, when in sufficient quantity, are afterwards reduced and the lead extracted. Lead obtained by the preceding processes is usually too hard for use, and it has to be subjected to a process of purification. This is effected by roasting the lead, sometimes for several weeks, in a reverberatory furnace. By this process the antimony, which is the chief impurity, is burned off, and the dross, which consists of the oxide of that metal with oxide of lead, is afterwards reduced and utilized as a source of antimony. The lead, when judged sufficiently pure, is then cast into ingots or pigs of lead. Prepared in this way the lead retains all the silver present in the original ore, and as that is always of value it used to be extracted whenever the quantity of silver present amounted to above 10 oz. per ton. But by a process of concentration, devised by Pattinson and introduced in 1829, it has become practicable to remove almost the whole of the silver, and thus also to extract it from lead which contains only a trifling percentage. The process depends on the property pure lead possesses of crystallizing at a temperature at which an alloy of lead and silver is still fluid. Thus if a mass of lead containing silver be melted in a pot, and slowly cooled, the crystals which separate first are almost pure

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lead, and the fluid portion contains the silver. By ladling out these crystals a purer lead is obtained and a richer alloy. If now a fresh charge of common lead be put into another pot and melted, the crystals which separate can be added to the previous crystals, and the richer alloy to the corresponding rich alloy. After two or three repetitions of this process a quantity of alloy is accumulated, which can be melted, and the excess of lead crystallized and transferred, while a still richer alloy is left, and the crystals in their turn can be treated, when, if any silver is present, it will remain in the small fluid residue. Continuing in this way, the lead is at last obtained almost free from silver, while the alloy is gradually enriched by the removal of lead crystals till it may contain some hundred ounces of silver to the ton, and is then cupelled. The mechanical arrangements for carrying out this operation consist of a series of pots arranged in a row, each provided with a fire. The charge is put into the centre pot, and the purified lead is gradually carried to the last pot on one hand, the alloy being transferred in the contrary direction. The introduction of this process has been of immense advantage: it has not only improved the quality of the lead, but, from the amount of silver it has made available, it has converted this into a large silver-producing country.

PROPERTIES.—Lead has a bluish-gray colour, and when recently cut a strong metallic lustre, but it soon tarnishes from exposure to the air; specific gravity, 11·458. It is soft, flexible, and inelastic; it is malleable and somewhat ductile, but in tenacity it is inferior to all ductile metals. It soils paper and the fingers, imparts a slight taste, and emits by friction a peculiar smell. It is a conductor of heat, melts at 635° Fahr., and when cooled slowly crystallizes in quadrangular pyramids. In perfectly dry air lead is not acted upon, but if water be present it is oxidized rapidly, and a basic carbonate of lead is formed. If carbonic acid is present in tolerably large quantity the carbonate is dissolved, and in this way water may become charged with lead to a considerable extent. The action of water and air upon lead is modified very much by the purity of the water. If salts, such as sulphates and phosphates, be present the action is diminished, but if chlorides or nitrates, the solution of the lead is increased.

If lead be heated in the air it soon becomes covered with a gray lustreless film, which gradually becomes yellow. This, which is called dross or scum, as if it were an impurity in the lead set free by melting, is the oxide of the metal, and it continues to form so long as any metal remains. At a higher temperature the oxide itself melts. Lead is dissolved by nitric acid, by sulphuric acid when hot, and by aqua regia, but it is very slowly acted on by hydrochloric acid. It combines with sulphur, phosphorus, and arsenic, and alloys with several of the metals, though hardly with iron or copper.

Lead forms two classes of compounds, the plumbous and plumbic, represented by the oxides PbO and PbO_2. Of these the plumbous are the more numerous. Plumbous oxide, or protoxide of lead, occurs native, and constitutes the mineral called *lead-ochre*. It is the substance formed when lead is heated in a current of air. When pure it forms a bright yellow earthy powder, and is called *massicot*. When got in the cupellation of silver or gold it has a brick-red colour, a scaly crystalline texture, and is usually contaminated with the oxides of other metals; in this state it is known as *litharge* (which see). Massicot is also prepared by heating the carbonate or nitrate of lead to decomposition. Protoxide of lead dissolves slightly in water, to which it imparts an alkaline reaction. It combines with the acids to form the ordinary salts of lead, and it is soluble in the fixed alkalies. The hydrated oxide of lead is got as a white precipitate when a solution of acetate of lead is added to an excess of ammonia. This hydrate has a great affinity for carbonic acid.

When the protoxide of lead is heated in a current of air it absorbs oxygen, and is converted into a bright red powder known as *minium* or *red-lead*. This substance, which is used as a paint and in glass-making, is manufactured in this country and on the Continent on an extensive scale. Red-lead has a crystalline structure; specific gravity, 8·9; it is a compound of the plumbous and plumbic oxides, and has usually the formula $2PbO,PbO_2$ assigned it. When heated to a pretty high temperature it loses oxygen; when boiled with hydrochloric acid chlorine gas is given off, and chloride of lead dissolves; by nitric acid it is decomposed, nitrate of lead dissolving and the plumbic oxide (PbO_2) remaining as a dark-brown insoluble powder. In strong acetic acid red-lead dissolves as a whole. Red-lead acts to some extent as an oxidizing agent, and is readily reduced to the plumbous condition.

The plumbic oxide, peroxide, brown or pure oxide of lead just mentioned can also be got by the oxidation of the protoxide by means of a current of chlorine gas or by fusing it with potash. In the former case it forms a soft brown powder, in the latter black hexagonal tables; and in this form it is said also to occur native. By heat the brown oxide loses oxygen; it is soluble in hydrochloric acid, chlorine being simultaneously set free; and it absorbs sulphurous acid, and yields sulphate of lead. Like red-lead it dissolves completely in nitric acid on the addition of sugar, and it acts freely as an oxidizing agent. Peroxide of lead combines with the alkalies, playing the part of the acid, and forming salts which are called plumbites. It combines with only a few of the acids.

Besides the three oxides already mentioned, there are two others—the suboxide, a dull velvety-black powder, which, when heated in the air, catches fire, and which, when moistened with water, is rapidly converted in the air into protoxide; and the sesquioxide, a yellow precipitate, which is produced by the action of bleaching solution or hypochlorite of sodium upon plumbous salts.

Of the plumbous compounds the following are some of the commoner and more important:—*Chloride of lead* ($PbCl_2$) is formed slowly by exposing the metal in thin plates to the action of chlorine gas, or by adding hydrochloric acid or a solution of common salt to the acetate or nitrate of lead dissolved in water. It is thrown down as a flocculent white precipitate, which dissolves in 30 parts of boiling water, and separates on cooling in brilliant white needles, which are sometimes tolerably large. It dissolves also in 135 parts of cold water. This chloride fuses at a temperature below redness, and forms as it cools a semi-transparent horny mass, sometimes called *horn-lead* or *plumbum corneum*. It bears a full red-heat in close vessels without subliming. In contact with air it fuses more readily, but it loses chlorine, and is converted into an *oxychloride of lead*. There are several of these basic chlorides, and as they all have a good colour and considerable body, they have been used under different names as pigments. Thus the oxychloride got by heating the chloride in the air is nearly white, and is nearly as good as white-lead. *Turner's yellow, mineral* or *patent yellow*, is got by the action of moistened sea-salt on litharge, by which means a portion of the protoxide is converted into chloride of lead. Another compound, called *Cassel yellow*, is a compound of a rich yellow tint, composed of chloride of lead with a large excess of

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oxide, and prepared by heating together 10 parts of litharge and 1 of sal-ammoniac. Some of these basic chlorides occur native. The *iodide of lead* is easily formed by mingling a solution of iodide of potassium with one of the acetate or nitrate of lead. It is of a rich yellow colour, and is deposited from boiling water on cooling in brilliant iridescent crystalline scales. The *sulphide of lead* or *galena* has been already referred to as constituting the most important ore of lead. The compound can be produced artificially by fusing lead and sulphur together, or in the wet way by passing a current of sulphuretted hydrogen gas through a solution of a lead salt. In the latter case it forms a heavy black precipitate moderately soluble in acids. The *phosphide of lead* is formed by dropping phosphorus into melted lead contained in a crucible, or by heating equal parts of lead-filings and glacial phosphoric acid with one-eighth of charcoal powder. It breaks into laminæ, and is composed of 88 lead and 12 phosphorus. The compounds of lead with oxygen acids are exceedingly numerous, these salts indeed forming excellent compounds for the preparation and investigation of acids. Only a few of them, however, are commonly used in the arts or in medicine. The *nitrate of lead* ($Pb\,2NO_3$) is formed by dissolving the metal, the oxide, or carbonate in nitric acid, and evaporating the solution to crystallization. It forms regular octahedrons, is of a milky white colour, and is moderately soluble in water; specific gravity, 4. A *subnitrate* is formed by boiling the nitrate with excess of oxide. The *sulphate of lead* is got by boiling lead and sulphuric acid together, or by addition of sulphuric acid to a soluble lead salt. It is a heavy white powder, which is insoluble in water and in dilute acids, but is soluble in alkalies, in acetate of ammonium, and other ammoniacal salts. The *oxalate* and *phosphate of lead* are also white insoluble powders. *Chromate of lead* is an insoluble yellow precipitate, got by adding potassic chromate to a soluble salt of lead. It occurs native, as has been already observed, but the artificial chromate is used in very large quantities in calico-printing. *Carbonate of lead* is got by mixing solutions of an alkaline carbonate and a salt of lead. It is a heavy white precipitate, readily soluble in nitric or acetic acid. The native carbonate has been already mentioned, and the mode of preparing the basic carbonate or *white-lead* is described under CERUSE (which see). One of the commonest of the salts of lead is the *acetate* ($Pb2C_2H_3O_2\,3H_2O$) or *sugar of lead*, so called from its sweetish taste and crystalline appearance. It is prepared by dissolving litharge or carbonate of lead in acetic acid, and crystallizing. If made with pure acid the salt is white, and is in small transparent prisms; but if made with crude pyroligneous acid, the salt has a dark colour from the empyreumatic products in the acid, and it is then known as *brown* sugar of lead. It is soluble in a little more than its own weight of cold water, and is soluble in alcohol. The crystals effloresce in dry air, and when heated give off water, and then decompose. Acetate of lead is used in dyeing, both as a precipitant and for pigments. In medicine it is employed externally as a lotion, but it is sometimes administered internally as an astringent. Care, however, has to be exercised in its use, for, like all the soluble compounds of this metal, it is a powerful poison. In cases where large doses of sugar of lead have been taken the proper antidote is Epsom or Glauber's salt: either of these salts converts the lead into the insoluble sulphate, which is inactive. Acetate of lead, when digested with an additional quantity of the oxide, combines with it, forming a soluble *basic* acetate which can be crystallized, but which is more commonly used in solution as a precipitant, and in medicine as a lotion under the name of Goulard's water or extract (which see). Other basic acetates are got by heating sugar of lead till it forms a white porous mass, or by addition of an excess of ammonia. These compounds are strongly alkaline, and combine with carbonic acid; and it is this property which is turned to account in the manufacture of white-lead.

Lead compounds are recognized by the black precipitate produced by sulphuretted hydrogen or an alkaline sulphide, by the white precipitate with sulphuric acid, the yellow precipitate with a chromate, and their ready reduction when heated on charcoal before the blowpipe.

USES OF LEAD.—Lead is much employed in the arts, particularly for buildings and cisterns. For the first of these uses it has many advantages. It is easily worked into any shape on account of its great softness, and is sufficiently malleable to fold two edges over each other, so as to make it water-tight without soldering. In the formation, however, of the great leaden chambers used in the manufacture of sulphuric acid the sheets are soldered, not with common solder, which the acid would readily attack, but with lead itself. This is called *autogenous soldering*. Although it is in very general use for water-cisterns, pumps, and pipes for conveying water, serious objections have from time to time been urged against its employment for this purpose, on account of the rapid oxidation of the metal, as already described. In practice, however, the presence of sulphate and carbonate of calcium in most waters effectually prevents this action. Mischief, however, has been produced by the use of lead in dairies. If the milk runs into the slightest acidity some lead will be dissolved, and injurious consequences will follow if it is taken into the stomach. In the granulation of lead for shot a small portion of arsenic is added. The proportion is about 2 per cent of the white or yellow arsenic. The compound is heated red-hot for three hours in an iron pot protected by a tight cover, when the contents are let fall into a reservoir of water from a height of 10 to 150 feet, as the shot are to be coarser or finer. The arsenic hardens the metal, and enables it to assume the spherical form more readily. Rifle-bullets, on the other hand, are made of the purest lead, as it is soft, and the bullet thus fits at once into the grooves of the barrel. 1 part of tin and 2 of lead form an alloy fusible at 350° Fahr., which is used by tinmen under the name of *soft solder*. Lead also forms an imperfect alloy with copper. The metal used for common brass-cocks is an alloy of these two metals. The union of these two metals, however, is exceedingly slight, for upon exposing the alloy to a heat no greater than that in which lead melts, the lead almost entirely runs off of itself. This process is called *liquation* (which see). With antimony it forms the important alloy called *type-metal*. Pewter is a hard alloy of 4 parts of tin and 1 of lead. In these proportions the lead is not attacked by organic acids such as the acetic. In 1881 the lead-ore raised in Great Britain amounted to 64,702 tons, yielding 48,587 tons of lead, from which again 308,398 ounces of silver were extracted. The computed values were, lead, £728,805; silver, £67,140.

LEAD, an instrument for discovering the depth of water. It is composed of a large piece of lead shaped like an elongated clock-weight, from 7 to 11 lbs. in weight, and is attached by means of a strap to a long line, generally of about 20 fathoms, called the *lead-line*, which is marked at certain distances—5, 7, 10, 13, 17, and 20—to ascertain the fathoms. When the depth is great the *deep-sea lead*, weighing from 25 to 30 lbs., is used. The line, which is much longer than the former, and called the *deep-sea line*, is marked

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by knots every 10 fathoms, and by a small knot every 5. The shorter line is called the *hand-line*. A hollow is scooped out in the lower part of the lead, and filled with tallow, that the nature of the bottom may be known from the portions of it that adhere to the tallow.—To *heave the lead* is to throw it into the sea in such a manner as shall best ascertain the soundings.

LEADING QUESTION, a technical legal expression denoting a question so put as to suggest to a witness the answer which he is to make. It is not allowed to be put except in cross-examination. It has not been found easy to fix any general rule as to what constitutes a leading question, for while the mind of the witness must be brought to bear directly on the subject of inquiry, no question should be so framed as to prompt a particular answer, such as a conclusive *yes* or *no*. In the case of a refractory witness the court has a discretion to permit him to be questioned as if on cross-examination. Leading questions are not allowed when a witness is examined in chief, that is, by the party adducing him, but they may be put by the opposite party to test his credibility; for if he contradicts himself the value of his evidence is diminished, or it may be entirely destroyed. In immaterial matters leading questions may be put to save time. The technical phrase in Scotland is *leading a witness*.

LEAD-POISONING. The use of lead in the arts is a frequent cause of painful, and sometimes of fatal effects, from the metal finding its way into the system. The glazing of culinary vessels with lead; the colouring of confectionery with the chromate, chloride, or carbonate of lead; the sweetening of sour wine by litharge or oxide of lead; and living much in rooms newly painted with lead-colours, act deleteriously on the system, producing lead or saturnine poisoning more or less violent. But the most frequent and virulent cases occur among painters and persons engaged in white-lead factories; and four forms of disease, either simple or complicated, are apt to manifest themselves—1, Lead or painters' colic, or dry belly-ache; 2, Lead rheumatism or arthralgia; 3, Lead palsy or paralysis, more particularly of the muscles of the fore-arm; and 4, Disease of the brain, manifested by delirium, coma, or convulsions —a form, however, of rare occurrence. Several premonitory phenomena enable the medical practitioner to detect *incipient* or *primitive saturnine intoxication*, of which the most pronounced and reliable is the existence of a bluish line along the margin of the gums at their junction with the teeth, which is due to the presence of sulphate of lead. By far the most frequent of these diseases is painters' colic, which is always accompanied with obstinate constipation, sharp continuous abdominal pains that diminish on pressure, hardness and depression of the abdominal walls, a slow and hard pulse, and a general disturbance of the system. This colic has been induced in whole families by the use of water which had acted strongly on leaden pipes or cisterns. The purer the water conveyed through lead, the more hurtful its effects. In *lead rheumatism* the acute pains in the limbs are diminished by pressure and increased by motion. They are accompanied by cramps, the affected parts being hard and tense, but there is no redness or swelling. An attack of *lead palsy* is preceded by lassitude and a feeling of numbness; the parts about to be affected become stiff, and there is a gradual loss of power. Sometimes there is a loss of sensation; the muscles of the ball of the thumb and the extensors of the wrist are most frequently affected. The most dangerous form of the disease, and one that often proves quickly fatal, is when the muscles of respiration which move the ribs are affected. The treatment of diseases induced by lead-poisoning is generally agreed on. The administration of vinegar, and shortly after of an emetic of some sulphate, is recommended, the vinegar converting the lead into one of its least poisonous salts, and the one most easily decomposed by the sulphates. By placing the patient in a sulphuretted bath all the lead-salts on the skin are converted into the inert black sulphide of lead. Lemonade slightly acidulated with sulphuric acid should be freely drunk, or a solution of sulphate of magnesia with a slight excess of sulphuric acid. The purgative action of the sulphate of magnesia will eliminate the insoluble sulphate of lead formed by the use of the latter potion. The lead is then dissolved out of the tissues by the application of iodide of potassium, and is removed in the urine. The obstinate constipation which accompanies lead-colic must be removed by the application of active purgatives, and these must be combined with some opiate to allay the pain. Much of what is called lead-poisoning is due to the want of cleanliness in those engaged in employments connected with lead.

LEADVILLE, a city of the United States, capital of Lake county, Colorado, 130 miles (by rail) W.S.W. of Denver, situated on a plateau over 10,000 feet above sea-level. Its first permanent building was erected in 1877, but now there are several churches and schools, banks and other large business establishments, a theatre, &c.; it is lighted with gas, fairly supplied with water, and there is an efficient tramway service. Leadville owes its remarkably rapid growth partly to the discovery of gold in the vicinity in 1860, but chiefly to its being the centre of a region extremely rich in argentiferous lead, which began to be extensively worked only so recently as 1878. The Leadville ore contains from 25 to 42 per cent of lead, and from 0·1 to 2 per cent of silver, the ore being chiefly worked for the sake of the silver. In 1880 the bullion produced considerably exceeded £3,000,000 in value. Pop. (1879), 5040; (1880), 14,820; (1883, estimated), 35,000.

LEAF. The leaves and the different parts of the flowers of plants are generally recognized by botanists as constructed upon the same plan. The leaf is regarded as the type of the foliar organs. 1. The *true leaves* are A, the cotyledons or seed-leaves; B, the stalk or stem leaves, passing into many forms. Thus filiform leaves or parts of leaves, when they twine around foreign objects, are termed tendrils; those which are stiff and pointed are named spines; very concave leaves that exhibit the form of a cup or pitcher are termed pouches (*asci*), as in *Nepenthes* (the pitcher-plant), *Sarracenia* (the side-saddle plant), &c. According to their various positions the following are again distinguished from the true leaves generally:—*a*, leaves of the inflorescence, similar to the stem-leaves, but bearing in their axils a blossom or a simple inflorescence; *b*, bracts, leaves different from the stem-leaves, and bearing in their axils a blossom or a simple inflorescence, of which the glumes of grasses and the leaves surrounding or supporting the heads of flowers of the Compositæ are examples; a number of bracts inclosing an inflorescence being termed an involucre; *c*, bracteoles, distinct from the stem-leaves, and standing beneath the blossom but upon its axis, as, for example, the two leaves under the blossom of the aconite or monk's-hood. 2. The *flower-leaves* are the following:—*a*, perigonial leaves, or sepals and petals of the perianth, where all are similar in appearance, as in the tulip; *b*, sepals of the calyx; *c*, petals of the corolla; *d*, stamens; *e*, pistils. The true leaves being organs of nutrition and assimilation, have their parts developed in accordance with the functions assigned to them. The parts of the

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flower, on the other hand, are concerned in reproduction, and are also specially fitted for their purpose in the economy of the plant. The Author of Nature having designed plants upon one simple plan, has adapted this plan to all the purposes of vegetable life. Hence, whenever any special end has to be accomplished, no new instruments or organs require to be created for it, one of the three general organs of the vegetable is adapted to the purpose, whether leaf, stem, or root, by taking upon itself, so to speak, the requisite form; and hence the beautiful and varied adaptations of the leaf-organ as a depository of food for the young plant in the cotyledons or seed-leaves; as bulb-scales in plants like the hyacinth and lily, where part of the nourishment in the foliage of one year is stored up in the scales or subterranean thickened leaves, for the early growth and flowering of the next year; as bud-scales, forming the protective coverings of buds, such as those of the seedling oak and the pea; as spines, tendrils, pitchers, and fly-traps. The typical character of the leaf was first discerned, but obscurely, by Linnæus. To the poet Goethe belongs the merit of giving the doctrine its proper place in the science of botany. In speaking of the parts of the flower as modifications of the leaf, however, it is not to be supposed that such modified parts ever were true leaves; all that is implied in the statement is that both organs are formed on the same plan, obey the same morphological law, and are arranged upon the same principle. The cell from which the leaf is formed is indeed very different, as regards the organic law impressed upon it, from the cell which is destined to develop into a sepal, petal, stamen, or pistil; yet on a minute examination of the parts, certain correspondences in form and structure are found to characterize both the nutritive and the reproductive organs and their associated parts. The conversion of stamens into petals in double flowers, and such a phenomenon as the reverting of the pistil to the leaf-form in the double-flowering cherry, become intelligible on the principle of a community of plan.

But the natural state of leaves is that of foliage, and in this aspect they are, in the first place, to be considered as a contrivance for increasing the surface of that large portion of the plant which requires exposure to the light and the air. This purpose is served by their expanded form, and their usually slight thickness as compared with their breadth and length. The actual extent of surface presented to the light and air by a tree in full leaf is immense. A good-sized elm has been estimated to produce a crop of 7,000,000 of leaves, exposing a surface of 200,000 square feet (or about 5 acres) of foliage. The lamina or blade is the principal part of the leaf, with or without a petiole or foot-stalk, and sometimes having, as in the rose, an appendage called a stipule. The leaf consists of two principal kinds of materials, viz. 1, the green pulp or parenchyma; and, 2, the fibrous framework or skeleton, which extends throughout the soft green pulp and is its support, giving the leaf strength and firmness. The upper and lower surface is covered with a thin transparent skin or epidermis. The fibrous part is composed of woody threads or bundles which enter the blade through the petiole, and spread out horizontally, forming the ribs and veins of the leaf, and determining its form. The arrangement of leaves upon the stem, called *phyllotaxis*, is one of alternation, thus securing the uninterrupted exposure of the upper surface of the leaf to the sun. The arrangement is carried out in two principal ways: the leaves are either alternate, one after another, only a single leaf arising from each node or joint of the stem; or opposite, when there is a pair of leaves on each joint of the stem; but sometimes, as in the woodruff, the leaves are whorled or verticillate, there being three or more in a circle on one joint of the stem. The result of this arrangement in an alternate-leaved stem is to cause the leaves to follow one another up the stem in a spiral manner; while any two successive leaves on the same species will also be separated from each other by just an equal portion of the circumference of the stem. The alternate principle of the leaf arrangement regulates that of the parts of the flower, in which the sepals of the calyx alternate with the petals of the corolla, the petals with the stamens, and the stamens with the pistils.

The green pulp of the leaf consists of cells of various forms, usually loosely arranged, so as to allow of the free entrance of the air. The green colour of the leaves arises from the presence of a waxy substance termed chlorophyll, or leaf-green. A large portion of the moisture absorbed by the roots of a growing plant, after being conveyed through the stem, is evaporated from the leaves. Thus a sunflower plant, about 3 feet in height, with 5000 or 6000 square inches of surface in foliage, has been found to exhale 20 or 30 ounces of water in a day. The surface of the leaf is perforated by myriads of microscopical orifices, named stomata or breathing pores, which are chiefly placed on the lower side, so as to be shaded from the direct action of the sun, which is unfavourable to their operation. Their immense numbers make up for their minuteness. They are said to vary in some plants from 1000 to 170,000 on the square inch of surface. The earthy or inorganic constituents of the plant, forming the ashes which remain on burning, enter the roots in a state of solution. The principal part of the organic food of plants is derived from carbonic acid floating in the atmosphere, and absorbed by the stomata of the leaves, and in a less degree from water entering by the roots, and also containing a proportion of carbonic acid held in solution. Under the influence of sunlight the green parts of the plant, and especially the leaves, have the power of decomposing carbonic acid and water, and originating out of their elements (viz. carbon, oxygen, and hydrogen) those peculiar chemical combinations which are capable of being endowed with life. The leaf is the principal organ in this vital and essential process, and as it not only removes from the atmosphere a gas which is not respirable in any quantity by air-breathing animals (viz. carbonic acid), but by its decomposition restores the oxygen-element of that gas to the atmosphere, the plant is therefore not more dependent upon the leaf for its food than are animals for pure air. While the processes of respiration and ordinary combustion are everywhere pouring into the atmosphere large quantities of carbonic acid gas, at the expense of the oxygen which is the essential atmospheric element, the leaves of plants are actively and constantly removing it, and replacing it with life-sustaining oxygen. It is also by the leaves that the juices of the plant are elaborated and fitted for the production of various important secretions. Besides its vital function of purifying the air, the leaf may be regarded as taking the leading part in providing food for the whole animal kingdom. Plants are the primary producers of nourishment. They alone, through the action of the leaf, transform mineral and gaseous materials into organized matter. No animal possesses this power. Animals consume what vegetables produce. In the economy of nature the function of the leaf holds a vital relation to the earth, the air, the sun, and the animal kingdom. See also the article BOTANY, and connected plates.

LEAF-CUTTING INSECTS. These insects are chiefly represented among the bees, the leaf-cutting

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bees or 'upholsterer bees' typifying good examples of the group. These insects, by means of their sharp jaws or mandibles, snip off the portions of leaves with which they line the cells of their nests. Wasps and other Hymenopterous insects may also be regarded as leaf-cutters in a broad sense, in that they cut up the leaves and leaf-fibres, and manufacture therefrom a pulpy material, with which the nest is constructed. This action somewhat imitates the manufacture of paper, the nest of the wasps and their allies being formed of a material which closely resembles brown paper in outward appearance.

LEAF-INSECTS (*Phylliidæ*). These very curious insects belong to the Orthopterous order of the insect class, or that of which the crickets, locusts, grasshoppers, and earwigs may be taken as familiar examples. They are occasionally known by the name of Walking-leaves, and obtain their popular name from the extraordinary resemblance presented by their wings to leaves, the texture, variation, and colour of leaves being accurately reproduced in every minute particular. The thighs and legs generally also correspond in colour and general appearance to the type of form assumed by the wings; and so closely are the leaves mimicked that these forms can hardly be detected among the plants they inhabit, save by the most careful observation. The colours of leaves at different seasons of the year are reproduced and imitated by different species of Phylliidæ. Thus we find various kinds of imitation, some forms mimicking the green colour of the leaves in spring, whilst others as perfectly reproduce the faded russet-brown colour of the autumnal foliage. Other insects with slender stick-like bodies mimic dried twigs accurately, and not only in appearance, but even in the singularly stiff awkward manner in which they place their legs in walking. These latter insects are accordingly known as 'Walking-sticks' (Phasmidæ). The Leaf-insects inhabit tropical regions principally, but a few smaller species occur in Europe. These phenomena, of which many other and as excellent examples might be given, both from the insects and from other classes of animals, are included under the subject of MIMICRY (which see). Under that heading a *resumé* of the chief conditions and examples of mimicry will be found; and without further trespassing upon that subject, it may suffice in the present instance to say that these mimetic appearances are in all probability assumed for the purposes of protection and defence; although, at the same time, some profess to see in these phenomena deeper relations and causes than those just mentioned. (Pl. LXV.-LXVI. fig. 11.)

LEAGUE, a measure of length varying in different countries. The word is supposed to be of Celtic origin, but it has been introduced into the modern languages of Latin origin through the Latin *leuca*. The Italian form is *lega*, the Spanish *legua*, the Portuguese *legoa*, and the French *lieue*. The Roman league was equal to 1500 paces, each of 5 feet. The English land league is 3 statute miles, and the nautical league 3 equatorial miles, or 3·457875 statute miles. The Italian league is reckoned as equal to 4 miles, each of 5000 feet. The Spanish league varies very much according to the locality. On the modern Spanish roads the league is estimated at 8000 *varas*, or 7416 English yards. The Portuguese league is equal to 3·84 English miles. In the old French measures the length of the league was different in every district, but the three principal leagues were the legal or posting league, equal to rather less than 2½ English miles, the marine league somewhat more than 3½ English miles, and the astronomical league equal to about 2¾ English miles. The metric league is reckoned as equal to 4 kilomètres. See FRANCE —Weights, Measures, and Money.

LEAGUE. Those political connections which have been called *alliances* since the French language has become the diplomatic language of Europe, were denoted, during the prevalence of Spanish and Italian influence, from 1500 to 1650, by the term *league* (from the Spanish word *liga*). To some alliances this term is more distinctly applied. Among these are the League of Cambrai, formed in 1508 between Louis XII., king of France, the German emperor Maximilian, and Ferdinand of Spain, for the purpose of humbling the Republic of Venice, and which was joined in 1509 by Pope Julius II. This league was dissolved in 1510, as many similar ones have been, in consequence of mutual distrust, and was succeeded by the *liga santa*, or holy league between the pope, Maximilian, Ferdinand, and Venice. The object of this was to compel Louis XII., whose allies had now become his enemies, to renounce his conquests in Italy; which object was gained. This was the first example of a holy league, which name was derived from the participation of the pope. Thirty years afterwards a holy league was formed in Germany. When the principal Protestant princes in Germany united in 1530, and again in greater numbers in 1536, to form the union of Schmalkalden, in order to protect their common faith and withstand the Emperor Charles V., the Catholic princes assembled at Nürnberg, in 1538, to take measures for the support of their own faith, and to oppose the designs of the Protestant princes; and as their league had the protection of the Catholic Church for its object, they termed it the *holy league*. A fourth league, also called the *Catholic*, was headed by Henry, duke of Guise, in 1576, against Henry III. of France. Its ostensible object was the support of the Catholic religion, but the Duke of Guise had further views of his own. As Henry III. was without male heirs, the throne, at his death, would pass to the Protestant Prince Henry of Navarre, to exclude whom, and to obtain the throne for himself, were the real objects of the Duke of Guise. His great popularity seemed to render the accomplishment of his design easy. The example given by Paris in his favour was followed by all the provinces. The league was sanctioned by the pope and the King of Spain. In 1588 the Duke of Guise was murdered at Blois, with his brother Louis, the cardinal, at the king's instigation. The league then declared the throne vacant, and named the third brother, Charles, duke of Mayenne, governor-general of the kingdom. Henry III. now sought aid from his former enemy, Henry of Navarre, but was assassinated by a fanatic leaguer in 1589. The war was then pursued by the league against Henry of Navarre till it was ended, in 1594, by his uniting himself to the Catholic Church, and the next year the league was formally dissolved.

We find a fifth league in Germany, in the seventeenth century, also termed *Catholic*. The Peace of 1555 had not sufficiently restrained the Protestants, and had taken too much from the Catholics. Both parties regarded each other with distrust. The one was accused of encroachments, the other of unreasonable pretensions. As Henry IV. of France was ready to support the Protestant princes in any manner, for the purpose of humbling the house of Austria, these princes, excited by the injuries inflicted upon the Protestant town of Donauwörth, assembled in 1608 to form a union for their protection. The Catholic princes now took the same steps as after the union of Schmalkalden: their association (1610) was also hastened by the disputes respecting the succession of Juliers-Cleves. The principal German princes laid claim to the possessions of John William, duke of Juliers-Cleves-Berg, &c., who had died in 1609 without heirs. Henry IV. supported the Protestant princes; a league was therefore formed by the Catho-

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lic princes at Würzburg, in 1610, at the head of which was Maximilian, duke of Bavaria. The unexpected death of Henry IV. prevented their coming at once to action; but the union and the league kept up a vigilant opposition to each other till the breaking out of the Thirty Years' war. The head of the union, Frederick, elector-palatine, became King of Bohemia, and then the two parties took the field. An accommodation was at last effected at Ulm, on the 3d July, 1620, by means of the united French, Spanish, Austrian, and the Bavarian influence, in which the union gave up the Bohemian cause, and after the imperial arms had become victorious in Bohemia the union was wholly dissolved in 1621. The designs of the Catholics were so well supported by the Duke of Bavaria, and his general Tilly, at the head of the troops of the league, that nothing but the interference of Gustavus Adolphus saved the Protestant princes.

LEAKE, William Martin, an English officer and author of some excellent works on the topography and antiquities of Greece, was born in London, in January, 1777. He was educated at the Royal Military Academy, Woolwich, and in 1794 received a commission in the artillery. After serving some time in the West Indies he was sent to Constantinople, to instruct the Turks in the use of artillery. While connected with the Turkish service he was sent on several missions to Syria, Egypt, and Greece. These travels gave a permanent direction to his studies, which were thenceforth devoted to the illustration of eastern antiquities. In 1823 he retired from the army to give himself up to his literary labours, which he continued till his death, in January, 1860. His principal works are, Researches in Greece, &c. (1814); Topography of Athens (1821); Journal of a Tour in Asia Minor (1824); Travels in the Morea (1830); Travels in Northern Greece (1835); Numismatica Hellenica (1854).

LEAMINGTON, or Royal Leamington Spa, a municipal borough (since 1875) and celebrated watering-place, England, Warwickshire, 20 miles south-east of Birmingham, and on the railway thence to Oxford. It stands among finely-wooded slopes in the valley of the Leam, here crossed by two handsome stone bridges, and consists of an old and a new town, separated by the Jephson Gardens and the Royal Pump-room Grounds. Both towns contain handsome streets, terraces, crescents, and squares. The principal edifices are a parish church in the decorated English style, with a tower and spire; several Episcopal chapels; a superior proprietary school or college; a town-hall (shortly to be superseded by the municipal buildings now (1883) in course of construction), assembly-room, theatre, music-hall, public hall, free library, and several bathing establishments, of which that of the Royal Pump-rooms is a large and elegant structure. The air is remarkable for its mildness and salubrity, and the springs, which include the three varieties of sulphurous, saline, and chalybeate, attract numerous visitors. Pop. (1881), 22,979.

LEANDER. See Hero.

LEAP YEAR, or Bissextile, the name given in England to every year of 366 days. The length of the year is a little less than 365¼ days. Julius Cæsar, in reforming the calendar, arranged that in every fourth year February should have 29 days instead of 28, and that two days should be called by the same name. The day whose name was repeated was, according to the Roman method of reckoning, the sixth before the calends of March, that is, the 24th February, and the year in which this name was given to two successive days was name *bissextile* (*bis*, twice; *sextus*, sixth). The name *leap year* is perhaps due to the notion that the calendar takes a leap of one day every fourth year to make up for its ordinary year being ¼ day too short. Every year is a leap year which is divisible by 4 without remainder, except the concluding years of centuries, every fourth only of which is a leap year; thus the years 1800 and 1900 are not leap years, but 2000 and 2400 are.

LEASE, a lease is a demise of lands or tenements, or permission to occupy them for life, or a certain number of years, or during the pleasure of the parties making the contract. The party letting the lands or tenements is called the *lessor*, the party to whom they are let the *lessee*, and the compensation or consideration for the lease the *rent*. There is a great difference in the habits and usages of different communities as to the modes of occupying lands, and the usual interest and title of the occupants. A great part of the cultivated territory of Europe is occupied by lessees, and rents constitute an immense proportion of the income of persons living upon profits, as distinguished from those who depend partly or wholly upon the fruits of their own labour; so that in all economical speculations in Europe, in regard to agriculture and the profits of lands and tenements, as distinguished from other species of property and income, the lands are always spoken of as being occupied by lease-holders; whereas in America, though the tenements in the large towns are usually occupied by lease, and in the country many farms are cultivated by those who have only a temporary interest in the soil, yet a great part of the territory is in the possession and occupancy of the proprietors. The general habit and prejudice is in favour of the occupant possessing the fee, and if his capital is not adequate to an independent and unincumbered ownership he generally prefers to purchase, though he mortgages the land as security for the purchase-money, rather than to hire. This mode of occupying would seem to excite a much more general disposition towards permanent improvements, since the person making them has not only in view the immediate advantage of the increase of products, but also the remote advantage of the increase of the value of the estate. Where leases prevail, however, it is the policy of the proprietors, as well as tenants, to extend the terms to long periods, and thus to give the parties a joint interest in improvements. The state of agriculture in many parts of Europe where the system of leases prevails, shows that this system is not so unfriendly to improvements in cultivation as to prevent agriculture from being brought to great perfection under it. But still, all things else being equal, it is quite evident that the proprietor himself will have the strongest motives to a mode of cultivation which adds to the permanent value and productiveness of the soil. It does not, however, follow that occupancy and cultivation by proprietors are on the whole to be preferred in all possible states of the arts, population, and wealth of a community. The prevailing occupancy by proprietors has to a great extent the effect of dividing the territory into small farms; the preference of one system or the other will therefore depend partly upon the kind of production carried on, for there is no doubt that some species of cultivation can be conducted more effectually, and so as to yield the greatest aggregate of products, if they are conducted on a large scale. In all kinds of industry, whether agricultural, commercial, or manufacturing, a great saving may be made, and greater results produced by the same labour, by combining the operatives in a large system. This is undoubtedly promoted by the system of leaseholds, since the wealthy are thereby induced to invest their capital in lands, as the safest property, and yielding the most secure income. The result will be that the

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territory will be owned and leased in large tracts. This is the reason why the leasehold system, instead of checking the progress of agriculture, probably on the whole contributes to it, notwithstanding the fact that a lessee, though for a long term, has less interest in increasing the permanent productiveness and value of the soil than the proprietor himself. There is, however, one disadvantage in the leasehold system, and a corresponding advantage in small proprietaries, which has recently been much dwelt on by political economists. It is alleged that the former creates a population of mere labourers, who in general depend wholly upon their wages for subsistence, and who naturally become very numerous in proportion to the demand for their labour, so that by their competition for employment their wages become reduced to the means of a bare subsistence. The labour in which they are employed is the rudest, and requires the least skill and previous instruction of all the different species, excepting perhaps fishing. The consequence is the raising a great population of a rude, uncultivated character, without property, and with very little self-respect or consideration with the rest of the community, and who finally become detached from the rest of the society, and have no avenue of escape from their humble condition, so that all generous emulation and enterprise die away from among them. Recent occurrences, however, tend to prove that the character of the agricultural labouring population is not quite so fixed as it is here represented to be. There appears in fact to be nothing in the nature of the case to prevent a free interchange of labour between agriculture and other industrial occupations, by which a general equilibrium of remuneration and other social advantages, according to the value of the labour performed, may be maintained between them. The isolation of agricultural labourers hitherto in England is probably due solely to two incidental causes, one of which is now happily being removed, the want of education and the pernicious character of the English poor-law. On the other hand the entire supersession of hired agricultural labour by peasant proprietary is a utopian notion, which, if it could be realized at all, would probably only carry us back several stages in the progress of civilization, to advance by slow degrees again to our present position. Moreover, in the comparison between the virtues of peasant proprietors and the vices of hired labourers, the advantage is not all in favour of the former. The rudeness of agricultural labour too has been greatly modified, and is likely to be still more so, by the more scientific treatment of agriculture which has now begun to prevail. The condition of the various members of the community is governed in a great degree by the operation of economical causes, the influence of which cannot be controlled. The power to lease will necessarily depend upon the extent of the lessor's estate in the land or tenement to be leased. A proprietor who has only a life-estate can of course lease his property only during his life. This is the case with a great part of the landed estates of Europe, the very object of entailments and other limitations being to secure the property against alienation, and against incumbrances to the prejudice of the heir or successor to the inheritance; and yet if the incumbent could not make a lease for a certain time it would be a great abridgment of the value of the estate to himself, as well as to his successor. The laws therefore provide that certain proprietors of estates for life may lease, on certain terms, for any time not exceeding a certain period, as twenty-one or forty years. The English common law makes a distinction as to the dignity of leasehold estates, which in many cases does not correspond to their comparative value and importance, the maxim being that a life-estate, being a freehold, is greater or of more dignity than a lease for ever so many years, as a hundred or a thousand. A freehold is real estate; whereas a lease is but a chattel interest, though the term may be longer than the longest life. The laws prescribe certain forms for the conveyance of real estate, requiring it to be by deed. These regulations extend also to leaseholds, usually requiring that a lease for more than a certain number of years, as three or seven, shall be in writing. A mere oral lease is binding for a shorter period; and when there is no specified period of occupancy, the term is understood to be determined either by the agreement for the payment of rent, as a tenement held on condition of paying a monthly rent is understood to be let for the term of a month at a time, or it is determined by the nature of the estate leased, as a farm is in a mere verbal lease understood to be let for one year, this being the shortest time for which it is supposed the parties would intend to contract. So it is held in England, and probably the same rule is law in the United States, though the decisions in some of the states seem to imply that the letting is also, in this case, determined by the period of payment of rent. But it can hardly be presumed that the parties could intend that the tenant should plough, and plant, and pay rent, and then quit. Leases usually stipulate that in case of failure to pay rent the lessor may enter and expel the tenant. As to notice to quit, if the lease be for a certain time no notice to quit at its expiration is necessary; but if the tenancy be at will or by sufferance, it can be determined by either party only at the end of the term for which the contract is construed to run, and the party intending to terminate it at the end of any term is bound to give previous notice of such intention. The general rule in this respect is that of reasonable notice, but what is reasonable is subject to diverse interpretation. Though a lease is terminated, yet the tenant may enter afterwards to harvest the crops of the fields planted by him before the expiration of his lease. The landlord has one privilege over other creditors of the tenant in respect to his rent, having a right to distrain chattels on the premises to enforce and secure payment of it. This remedy exists in Britain. A question has been much discussed, and the subject of frequent adjudications, as to the right of the tenant, at the expiration of his lease, to remove fixtures erected by him on the leased premises. (See FIXTURES.) A lease generally contains covenants or mutual stipulations by the lessor and lessee; on the part of the lessor only one direct covenant, viz. for the quiet enjoyment of his premises by the lessee; who, on his part, binds himself to pay rent and taxes, to give certain necessary repairs, not to carry on an offensive trade, and to insure. There is a proviso for re-entry in case of the non-fulfilment of any of these stipulations. In agricultural leases a covenant is always implied, though not expressed, that the tenant will use the land in a husband-like manner, and not unnecessarily exhaust the land by improper tillage. It is more usual to have a special covenant inserted as to the mode of cultivation; and this, the cropping clause, should be framed in accordance with the best systems prevailing in the neighbourhood. Leases may be forfeited for other causes than the non-fulfilment of these conditions: for instance, if the lessee commit felony, or any act that, in a court of record, amounts to a forfeiture of his estate. By waste, as pulling down buildings, or suffering them to decay for want of repair, tearing up floors or doors, destroying timber, or rabbits in a warren, fish, &c. By the tenant ceasing to reside on the premises, and by alienation; or when the lessor grants to

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another a greater estate in the premises than he has himself. In Scotland the length of leases is generally nineteen years; but in pastoral farms, where no rotation of crops is required, or substantial improvement expected, leases of seven and ten years have been frequently made. Leases on the Scotch system are now becoming general in England and Ireland.

LEATHER. See CURRYING and TANNING.

LEATHER, ARTIFICIAL. Owing to the demand for leather being in excess of the supply, and the consequent high price of that indispensable article, many fabrics have been introduced with the intention, more or less successful, of supplying its place. An article of this sort known under the name of leather cloth, was first produced in America about 1849, and was brought well under the notice of the British public at the Exhibition of 1851. A textile fabric (generally unbleached cotton, calendered to make it smooth) is coated with linseed-oil, turpentine, lampblack, and other ingredients. It is then scraped with a knife to produce a uniform surface. It is afterwards dried in a heated oven, and is passed between rollers covered with pumice dust to rub the composition smooth. These processes are repeated several times. Three or four coats of a sort of enamel paint are then applied. The grain of morocco leather is imitated by passing the cloth between grooved rollers; or patterns in relief may be obtained by passing it between embossing rollers. Another kind of artificial leather, invented by Mr. Seager, is made of leather parings and shavings reduced to a pulp, and then moulded into buckets, machinery bands, picture-frames, and other useful and ornamental objects. The vegetable leather of the Messrs. Spill consists of caoutchouc dissolved in naphtha, spread upon a backing of linen. All odour of the naphtha is removed by a chemical process, and the fabric may be made of any thickness by additional backings of linen cemented with the caoutchouc. Its strength is almost marvellous, and it can be produced at about a third of the price of leather. It may be used for table-covers, carriage-aprons, soldiers' belts, harness, bookbinding, &c. It has several advantages over leather proper, among which we may mention, that however thin the imitation is, it requires considerable force to tear it; it is impervious to damp; moisture may remain long upon it without injuring it, and its polish is increased rather than decreased by friction. Various other substitutes of leather have been recently introduced, consisting of the application of oily pigments to cloth, or thin layers of leather attached to cloth, felt, or other backing by caoutchouc cement.

LEAVEN, a piece of sour dough, or dough in which fermentation has commenced, employed to ferment and render light the fresh dough with which it is mingled. (See BREAD.) The use of leaven dates from remotest antiquity; the addition of yeast or barm to quicken the process of fermentation is of modern date.

LEAVENWORTH, the largest city and commercial emporium of Kansas, United States, situated in the county of its own name, on the west bank of the Missouri, 2 miles south of Fort Leavenworth, and is surrounded by one of the richest agricultural regions in the valley of the Missouri. The city is laid out in rectangular blocks, the streets running north and south, east and west. It is the headquarters for outfitting government supply trains for western forts. There is a great transport trade in cattle, horses, and mules. There are in the city several saw-mills, flour-mills, brickworks, breweries, &c., and manufactories of carriages, wagons, furniture, and shoes. Leavenworth was laid out in 1854, and its extensive river and railway communications have given it a considerable trade. There are two large coal-mines in the vicinity. Pop. (1880), 16,546.

LEBANON, MOUNTAINS OF, two nearly parallel mountain ranges, which, commencing in the north of Palestine, about lat. 34° 25′ N., stretch south-south-west, inclosing between them a valley about 70 miles long by 15 miles wide, now simply distinguished by the name of El-Bukaa, 'the valley,' but known anciently by the name of Cœlē-Syria. To distinguish the two ranges that on the west is called Lebanon, and that on the east Anti-Lebanon; the Arabs, however, call the former Jebel-Libnan, and the latter Jebel-esh-Shurky. Lebanon, which runs almost parallel to the Mediterranean coast, and at no great distance from it, may be considered as terminating near the coast, a little north of the mouth of the Litani, between Tyre and Sidon. It is the far loftier range of the two, and presents almost a continuous ridge without any marked break. It has never been accurately measured, but its loftiest summit—Jebel Sunnin, near Beyrout, is supposed to be at least 10,000 feet above the sea. Though under the snow limit, snow and ice remain throughout the year in the ravines around and below its summit, and at a distance assume the appearance of radiant stripes. Anti-Lebanon has a much lower average height, but claims the culminating point of the whole chain in Jebel-esh-Sheikh, which is situated west-south-west from Damascus, and has probably a height of about 11,000 feet. At this point, where the two ranges bend towards each other, and almost meet, leaving only a precipitous, narrow gorge, through which the Litani has forced its way, the chain properly terminates, though a range of lower heights is continued south as far as the shores of the Lake of Tiberias. The prevailing rock of Lebanon is limestone, of a whitish colour; and from this its name, which means 'white,' is supposed to be derived, though others ascribe it to the snows which cover it. The waters which descend from the western slopes of Lebanon are carried directly to the sea without being accumulated into any proper stream; those on the eastern slopes of Anti-Lebanon go chiefly to augment the Baraada, to which the plain and environs of Damascus owe so much of their fertility and beauty; the slopes of both ranges bordering El-Bukaa send their waters to the Litani, which flows between them in a south-south-westerly direction, and shortly after escaping from their barriers, turns west and falls into the sea. In the south part of the chain the Upper Jordan has its source. The loftiest summits of Lebanon, presenting lofty precipices and wild narrow gorges, are almost absolutely barren; but at some distance below vegetation makes its appearance, the pastures become verdant, and, by means of artificial terraces, cultivation is successfully carried on upon rugged slopes where it would otherwise be impossible. The habitable districts are occupied towards the north by the Maronite Christians, a hardy and industrious race, and towards the south by the warlike Druses. Numerous villages cling on the sides of the cliffs and convents are perched on the top of every peak. The forests of cedar for which Lebanon was anciently celebrated have to a large extent disappeared, and there are none now on Anti-Lebanon. (See CEDAR.) The other prevailing forest trees are firs and oaks. The vine is largely cultivated, and olive, fig, and mulberry trees abound. Considerable numbers of wild beasts, as the jackal, hyena, wolf, bear, and panther, inhabit the glens and higher peaks.

LEBEDIN, a town of Russia, in the government of Kharkov, and 75 miles west-north-west of the city of that name. The girdles and sashes which are worn by the Russian peasantry are manufactured

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here to the value of many thousands of pounds, and are sent for sale to Moscow and the fairs of other important towns. Pop. 16,958.

LEBLANC, NICOLAS, a man famous in the history of technical chemistry, was born at Issoudun (Indre) in 1753. He studied medicine, was appointed surgeon to the Duke of Orleans, and after the revolution administrator of the department of the Seine. He devoted much attention to chemistry, and has made his name well known in connection with the process for the conversion of common salt into carbonate of soda. His attention was directed to the subject in 1786, by the Academy offering a prize of 2400 livres for the discovery. After a number of trials Leblanc believed himself to have succeeded, and he then showed the Duke of Orleans the advantage of carrying out the process on the large scale. Before undertaking such a responsibility the duke referred the matter to Darcet (see DARCET), professor at the College of France, who, being engaged with other work, intrusted it to his assistant Dizé. According to the account given by Dizé (see DIZÉ) the process devised by Leblanc would give no result, and it was not until Dizé had made an accidental discovery of the true conditions of the experiment that they succeeded in making soda. The work, which was near St. Denis, was started February 12, 1790, the partners being the Duke of Orleans, Henry Shée, Dizé, and Leblanc himself. Everything promised well, but the revolution soon dissipated their anticipations. Leblanc had secured the invention by a patent in 1791; but the committee of public safety compelled the disclosure of the secret as being of public utility, and thereafter any one could put the manufacture in operation. The company was ruined. Leblanc in vain sought for an indemnity, and passed the rest of his life in poverty, and in struggles for compensation. Having consumed all his means, and in utter despair, he committed suicide January 16, 1806. So late as 1855 a petition for compensation was addressed to the emperor by Leblanc's descendants, and upon this occasion an inquiry into the claims advanced by Dizé was instituted by the Academy. The result arrived at by the majority of the commission was unfavourable to Dizé, and gave the discovery of the essence of the process to Leblanc. Chevreul, however, supported Dizé, so that the evidence is not absolutely conclusive. As to the value of the process itself there cannot be the slightest doubt. Not only has it made soda one of the cheapest and most plentiful articles, thereby facilitating the manufacture of soap, the cleansing and bleaching of cloth, and endless other applications, but it has given impulse incidentally to the manufacture of sulphuric acid, and thereby to the utilization of sulphur and metallic sulphides, thus reacting upon metallurgy, and has entirely originated the manufacture of chlorine and of bleaching-powder. Within the last few years the process has been extended in Germany to the manufacture of potash from native chloride of potassium, and the results have been quite satisfactory.

LEBRIJA, a town of Spain, Andalusia, in the province of Seville, and 28 miles south by west of the city of that name, near the left bank of the Guadalquivir. It is tolerably well built, and has several squares, a large church, formerly a mosque, in a mixture of the Arabic, Roman, and Gothic styles; a town-house, college, hospital, prison, convent, and the remains of an ancient castle. Pop. 7741.

LEBRUN, CHARLES, a French painter, born at Paris in 1619. He studied with Vouet, and soon surpassed not only all his fellow pupils, but also his master. After his return from Rome, in 1646, where, under Poussin, he had studied principally the works of Raphael and the remains of ancient art, he received the order of St. Michael, and in 1648 was made president of the new Royal Academy of Painting and Sculpture. He was also named prince of the Academy of St. Luke, in Rome. From 1661 he was principally employed in embellishing the residences of Louis XIV. and his nobles with works of art, and in superintending the brilliant spectacles of the court. He embellished Versailles in particular, and was also director of the Royal Gobelins Manufactory. With the death of Colbert his influence declined. He died in 1690. Few painters have so well understood the human character and the expression of the passions. This appears from his treatises Sur la Physionomie, and Sur les Caractères des Passions. His invention was fertile, and he combined a correct judgment with a lively imagination and facility in execution. He aimed at the highest accuracy of detail, consulting the remains of antiquity, books, and learned men on the minutest subjects. His weak point in painting was his colouring, particularly of flesh.

LECANORIC ACID, or LECANORINE ($C_{16}H_{14}O_7$), a substance got from a variety of lichens, such as *Rocella tinctoria*, *variolaria*, and *lecanora*, from which cudbear is prepared. The acid is extracted by treating the lichen with water, adding lime, and when the precipitate has settled down adding an acid to the fluid. The precipitate thereby produced is filtered, dried, and extracted with alcohol, from which the lecanoric acid is got by crystallization. It is a white, tasteless, and inodorous body, crystallizing in needles, with one part of water of crystallization. It dissolves sparingly in hot water, but more readily in alcohol. It is a strong acid, reddening litmus, expelling carbonic acid, and neutralizing the alkalies. When heated alone it gives off water, and afterwards a distillate which solidifies in crystals, and is composed of orcin (which see). The same body is got by the prolonged action of lime or baryta. It is acted upon by bleaching-powder, by ferric chloride, and by air when dissolved in ammonia, giving characteristic red or purple colours.

LECCE (the *Aletium* or *Lupiæ* of the Romans), a town in Southern Italy, capital of the province of its own name, 50 miles E.S.E. of Taranto. It is surrounded by a deep ditch, and walls flanked with towers and defended by a castle. The principal edifices are the cathedral, with a heavy exterior and a majestic interior; numerous other churches, almost all Gothic; a royal college, seminary, theatre, and foundling hospital. The staple manufacture is snuff, and there is an active trade in cotton and woollen goods, wine, and oil. Pop. 21,742.

LECTERN or LETTERN, the reading desk or stand on which the larger books used in the services of the church are placed. It is found both in Roman Catholic churches and in the cathedrals and college chapels of the Anglican Church. The most ancient lecterns were made of wood, and elaborately carved. Modern ones have been made of marble or brass, very ornamental in design and of excellent execution. They are sometimes made in the form of an eagle, the outspread wings of which form the support for the volume.

LECTIONARY, one of the service-books of the church of the middle ages, so termed as it contained the lessons (*lectiones*) of the church service. Two of these deserve to be specially noticed. The first, the Roman Lectionary, contained the epistles and gospels of the Roman missal, sometimes also all the lessons of the various services in the church, in which case it was termed the Plenarium. The compilation of its most ancient form is ascribed to St. Jerome; it was revised and re-cast in the eighth century. The

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second, the Gallican Lectionary, is believed to represent the rite of the ancient Gallican Church, principally because one of the few saints' offices which it contains is that of St. Geneviève, the patron saint of Paris. It was published from a MS. of the monastery of Luxeuil, but unfortunately this interesting relic is imperfect.

LECTOR (*reader*), in the early church, a servant of the church whose business it was to read parts of the Bible, and other writings of a religious character, to the people. They were consecrated by prayers and ceremonies for this office, and when their office became extinct the consecration still remained; so that the lectorship now forms one of the inferior orders. Lectors are mentioned by Justin Martyr in the second century, and appear to have been proper officers of the church in the third century. It is probably from this institution that the order of preachers called *lecturers* in the Anglican parish churches is derived; they hold a distinct office from the vicar, rector, or other ecclesiastical functionary, are chosen by the vestry or by the parishioners, are supported by voluntary contributions, and usually officiate on Sunday afternoons. In Germany a teacher of modern languages in a university is called *lector* if he is not a professor.

LEDA, in Greek mythology the wife of the Spartan king Tyndarus. In order to enjoy her Zeus changed himself into a swan, or, as some say, into a goose, in which form he is represented with her in a picture from Herculaneum. By him she had Pollux and Helen, and by Tyndarus, Castor and Clytemnestra.

LEDBURY, a market town of England, Herefordshire, on a declivity at the southern extremity of the Malvern Hills, 14½ miles east by south of Hereford. It has a handsome ancient church in the Norman style, with a detached tower, surmounted by an elegant spire. Malting, brewing, and glove-making are carried on to a considerable extent, and there is a trade in cheese, hops, perry, and cider. Pop. 3263.

LEDGER LINES, those lines in music which are added above or beneath the five composing the staff for the reception of such notes as are too high or too low to be placed upon or within it.

LEE, in nautical language, means the side opposite to that from which the wind is blowing; as, if a vessel has the wind on her port side, that side will be the weather side, and the starboard will be the lee side. *Under the lee* expresses the situation of a vessel anchored or sailing under shelter of the land.

LEE, HENRY, an American revolutionary general, was born in Westmoreland county, Virginia, 29th January, 1756. He was educated at Princeton College, and graduated in 1774. Two years later he was appointed captain of a company of cavalry in Colonel Bland's Virginia regiment, and soon distinguished himself by the excellent discipline which he introduced into his company, and the care which he took of his men and horses. He was enabled by his strict discipline to move with celerity and effect, and seems to have at once adopted that rapid and daring system of tactics which made 'Lee's legion' so efficient in the south. In the memorable retreat of Greene before Lord Cornwallis Lee's legion formed the rear-guard of the American army, the post of the greatest danger, and covered itself with glory. At the battles of Guildford Court-house and Eutaw, and in reducing Forts Watson, Motte, Galphin, Grierson, and of Granby and Augusta, Lee performed very important services, and specially distinguished himself. On the conclusion of the war he was sent to Congress as a delegate from Virginia, advocated the adoption of a federal constitution, and in 1792 was chosen governor of that state. In 1794 he was instrumental in suppressing the 'whisky insurrection' in Pennsylvania. In 1801 he retired from public affairs, and established himself as a Virginian country gentleman; but the profuse hospitality and free mode of living then prevalent reduced him to great pecuniary difficulties. He died at Cumberland Island, Georgia, 25th March, 1816, in consequence of injuries received in a riot at Baltimore. He is the author of a valuable work entitled Memoirs of the War in the Southern Department of the United States (1809).

LEE, NATHANIEL, a dramatic poet, was born at Hatfield about 1657, and educated at Cambridge, whither he went in 1668, and afterwards went to London, misled, it is said, by the promises of Villiers, duke of Buckingham. Neglected by his patron he turned his attention to the drama, and in 1675 produced his tragedy of Nero, and from that time to 1681 produced a tragedy yearly. He also tried his abilities as an actor, but failed in the attempt. In 1684 insanity rendered his confinement necessary, and he was taken into Bethlehem Hospital, where he remained until 1688, when he was discharged and wrote two more tragedies, the Princess of Cleves and the Massacre of Paris, which appeared in 1689 and 1690. He died in 1691 or 1692 in consequence of some injury received in a drunken night frolic. He is the author of eleven plays, all of which were acted with applause; but his natural fire and pathos were buried in a torrent of words, and clouded by a tendency to turgid and bombastic eloquence.

LEE, RICHARD HENRY, a distinguished American of the Independence era, born January 20, 1732, at Stratford, Westmoreland County, Virginia. He was educated first at home, and then at the academy of Wakefield in England. He returned to his native country at about the age of nineteen, and at the age of twenty-five was appointed a justice of the peace for his native county. Not long afterwards he was chosen a delegate to the House of Burgesses from Westmoreland county. In 1764, when the declaratory act was passed in the British Parliament, in pursuance of the right claimed by that body of taxing America, he was the first to bring forward the subject to the notice of the assembly of which he was a member. A special committee having in consequence been appointed to draught an address to the king, a memorial to the House of Lords, and a remonstrance to the House of Commons, Mr. Lee was placed on it and selected to prepare the two first papers. In 1765 Patrick Henry introduced in the Virginia Legislature his resolutions against the stamp act, which had just been passed by the British Parliament. Mr. Lee lent Mr. Henry's motion his powerful and most zealous assistance. He was sent as a delegate from Virginia to the first American Congress, which met at Philadelphia 5th September, 1774, and was at once recognized as a leader in that assembly. He drew up most of those addresses to the king and the English people which were admitted by his political opponents to be unsurpassed by any of the state papers of the time. When war between the colonists and Britain became inevitable Lee was placed on the various committees appointed to procure the munitions of war, and to organize a vigorous resistance to the British government. On the 7th June, 1776, he introduced the motion, 'That these united colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British crown; and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved,' and supported it by one of the most eloquent speeches ever delivered in Congress. In consequence of weak health he was unable to serve his country in the field, but his activity as a politician was as unceasing as valuable. In 1784 he was

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unanimously elected president of the Congress, and when the federal constitution was established he entered the Senate for his native state. In 1792 he retired into private life, and died in Virginia on the 19th June, 1794.

LEE, ROBERT EDMUND, a distinguished American general, commander-in-chief of the Confederate army, and one of the most skilful tacticians who took part in the great Civil War, was born in Virginia in 1808. He was placed by his father, General Henry Lee, at the military academy of West Point, which he quitted in 1829 with the rank of second lieutenant of engineers. After making a tour in Europe he obtained a captaincy in 1838, and in 1847 was appointed engineer-in-chief of the army destined for the Mexican campaign, in which his brilliant services at Cerro-Gordo, Contreras, Cherubusco, and Chapultepec (where he was wounded) gained for him in rapid succession the grades of major, lieutenant-colonel, and colonel. In 1852 he was appointed superintendent of military studies at West Point, and afterwards accompanied M'Clellan to witness the operations at Sebastopol. On the secession of Virginia from the Union Lee threw up his commission in the United States army, was intrusted with the command of the Virginian army, and subsequently was selected by President Davis as commander-in-chief. In June, 1862, he defeated the Federal army under M'Clellan, who was compelled to seek the shelter of its gunboats after its decisive defeat at Gaine's Mill (26th June). Aided by Stonewall Jackson Lee defeated Pope in a series of engagements commencing 20th August, and ending with the victory of Manassas Junction on the 30th. Lee now determined to cross the Potomac into Maryland and threaten Washington itself. He crossed on the 5th September, but experienced a series of checks at Hagarstown, Sharpsburg, and Antietam (14th–17th September), and was obliged to withdraw behind the Rappahannock. On the 13th December he attacked and completely routed the Federalists under Burnside at Fredericksburg, and on the 2d and 3d May, 1863, gained the splendid victory of Chancellorsville over Hooker, losing, however, his intrepid coadjutor Stonewall Jackson. After this success Lee resolved to push on to Washington, but was beaten by Meade at Gettysburg, July 1st and 3d, and forced to retreat into Virginia. In the autumn of that year he collected all his forces and resumed the offensive, and defeated Meade on Nov. 7. In May, 1864, he joined Longstreet and advanced upon Fredericksburg, while Grant at the head of a large army entered Virginia. A series of sanguinary engagements took place at Spottsylvania (5th to 10th May), in which Lee was worsted, but on June 3d he defeated Grant at Chickahominy. The Federals, however, with their great superiority of men and material, gradually hemmed in the Confederate forces. Richmond and Petersburg fell early in April, 1865, and on the 9th Lee and his army surrendered to Grant at Burkesville, thus putting a virtual end to the four years' struggle. General Lee then retired into private life, was elected president of Washington College, at Lexington, Virginia, in 1865, where he died on the 12th October, 1870.

LEE, SAMUEL, a distinguished orientalist, was born of poor parents at Longnor, Shropshire, 14th May, 1783, was educated first at a charity school, and at the age of twelve was apprenticed to a carpenter. At the age of seventeen he determined to learn Latin, and although he had some difficulty in procuring the necessary books contrived to effect his purpose before the close of his apprenticeship. Greek, Hebrew, Chaldaic, and Syriac he mastered in quick succession, and the report of his acquirements having reached Archdeacon Corbet in 1810, he obtained through the influence of this ecclesiastic the mastership of Bowdler's Foundation School, Shrewsbury. He still continued his study of languages, and made a rapid progress in Arabic and Persian, together with French, German, and Italian. In 1813 he entered Queen's College, Cambridge, and took his degree of B.A. in 1817. Two years later he was appointed Arabic professor in that university, obtained the degree of D.D. from Halle in 1822, and from Cambridge in 1833, was made regius professor of Hebrew in the latter university in 1831, and died rector of Barley, Hertfordshire, 16th December, 1852. His works comprise translations of the Bible into various eastern languages; a Grammar of the Hebrew Language; The Book of Job, translated from the original Hebrew (three vols. London, 1837); Hebrew, Chaldaic, and English Lexicon (London, 1840); a translation from the Arabic of the Travels of Ibn Batuta; and numerous controversial and other pamphlets.

LEE, SOPHIA and HARRIET, were the daughters of John Lee, a player at Covent Garden Theatre. Sophia, born at London in 1750, early showed a decided taste for literary pursuits, but did not appear as an authoress till her thirtieth year, when she produced a play called The Chapter of Accidents, which met with much acceptance at Haymarket Theatre, and produced a sum which enabled her, in connection with her younger sister Harriet, born in 1756, to open a young ladies' school in Bath. Here too she found time for literary labours, and in 1784 published a romance entitled The Recess, or a Tale of Other Days, which may be regarded as the forerunner of the historical school of novels. The play Almeyda, Queen of Granada, had little success; but both sisters rose high in reputation by the publication of the Canterbury Tales. Of the twelve tales of which the book consists ten were contributed by Harriet; the remaining two (The Young Lady's Tale and The Clergyman's Tale) and an introduction to the series were written by Sophia, who cannot be said to have equalled her sister in this department of literature. The German's Tale furnished Lord Byron with the idea and some of the materials of his play of Werner. In 1803 Sophia, having acquired a competence sufficient for all her wishes, retired from the school establishment, and soon after published The Life of a Lover, a novel which she had written some time before. Her play, The Assignation, produced in Drury Lane in 1807, offended, by some supposed personal allusions, and was only performed once. She died at Clifton in 1824. Harriet, besides her large share in the Canterbury Tales, wrote two novels, called The Errors of Innocence and Clara Lennox, and a play entitled The New Peerage. After attaining the advanced age of ninety-five, she died at Clifton in 1851.

LEECH, a genus of Annelida or Worms, forming the type of the order Hirudinea (synonyms, *Suctoria*, *Discophora*) of that class. The distinctive feature of the leeches consists in the presence of one or two sucking-discs. Where one sucking-disc exists it is situated at the posterior extremity of the body, and where two discs are present each end of the body possesses one. In the leeches there are none of the lateral appendages found in other worms, and which consist of bristles and foot-processes, and the rings or segments of the body are very numerous and closely set. The leeches are further hermaphrodite, that is, possess the male and female reproductive organs in the same individual. The leech order includes forms both nearly allied to, and distinct from, the familiar and medicinal species, and which are both fresh-water and marine in habits. Thus we find the familiar horse-leeches (*Hæmopis san-*

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guiruga) of our fresh-water ponds and ditches included in this group. These forms are provided with a few small teeth of blunted form. The Clepsines, little fresh-water leeches, possess a hinder sucker only, and a mouth which is proboscis-like and capable of protrusion and retraction. Where a front-sucker is wanting, as in Clepsines, the mouth performs the function of an anterior disc. The Clepsinidæ live upon fresh-water plants, and appear to prey upon the fresh-water snails (Lymnæidæ) so common in ponds and ditches. Similarly, we find marine leeches of various kinds living parasitically upon higher forms. The Pontobdellæ, possessing both suckers, are small leeches inhabiting the sea, and which fix themselves by their anterior sucker to the bodies of certain fishes, of which the skate forms a good example. And the Branchiobdellæ, partly marine and partly fresh-water in their habits, are found parasitic on the gills of the cray-fish and on the *torpedo* or electric ray, one of the skate tribe. The Branchiobdellæ present exceptions to the other leech forms in that they breathe by gill-like organs, all other leeches breathing either by the general surface of the body or by little sac-like pouches known as the respiratory *sacculi*. The Land-leeches of Ceylon may also be mentioned as included in the leech order. These latter forms are about 1 inch long, and are terrestrial in habits, living amongst damp leaves and in like situations, but apparently seeking the open ground in wet weather. Their thickness is described as being about that of a fine knitting-needle, but their bodies appear capable of distention to about double the size and length just mentioned. These land-leeches become great pests to travellers in Ceylon. They succeed in fastening themselves on man and beast, and cause much irritation and weakness from the numerous bites, each drawing therefrom a minute stream of blood. Sir Emerson Tennent, describing these pests, says: 'Horses are driven wild by them, and stamp the ground in fury to shake them from their fetlocks, to which they hang in bloody tassels. The bare legs of the palankin-bearers and coolies are a favourite resort. As their hands are too much engaged to be spared to pull them off, the leeches hang like bunches of grapes round their ankles; and I have seen the blood literally flowing over the edge of a European's shoe from their innumerable bites.' The medicinal and familiar leeches form, however, the most generally interesting members of the order. These species are known by the minutely-ringed body, which is composed of as many as 100 annulations, and by the presence of an anterior and posterior sucker. The mouth of the medicinal species, situated in the middle of the anterior sucker, is provided with three small teeth of semicircular or crescentic form, the upper or convex edges of which are provided with numerous minute serrations or teeth-like processes, so that each tooth looks like a segment of a doubly-toothed circular saw. Upon the presence of these teeth, and also upon the power of the medicinal leeches of retaining within the body a large supply of blood, depends the great utility of the leech to man. Thus fixing itself by the anterior sucker, the three teeth are made to play against the tightly-stretched skin by the action of appropriate muscles, and a Y-shaped wound—the limbs of the Y corresponding to the three teeth—is thus produced. This wound, like that produced by the soldier's bayonet, is of a kind which, whilst difficult to close, also permits a large and continuous flow of blood, and the sucker of the leech is brought into play as a pump-like organ, to draw the blood from the wound and force it into the alimentary canal of the animal. The large size of the stomach of the medicinal leech has already been alluded to, this structure occupying nearly the whole interior of the body cavity, and being furnished with a number of side-pouches or dilatations which largely increase the capacity of the organ, and fit it for receiving a large quantity of blood. In these side-pouches the blood is said to be retained in a fresh state for a considerable period of time, and the creature can thus from time to time allow a quantity of the fluid to pass into its digestive tract for the purpose of nutrition. The amount of blood extracted by leeches varies greatly according to the circumstances both of the patient and the animal. From 4 drachms to 1 oz. may be stated to be the average quantity which may be detracted. The wound made by the leech is one the hæmorrhage from which is sometimes exceedingly difficult to stop. The most satisfactory ways of arresting the hæmorrhage are, firstly and most simply, by cold, and by pressure with a plug of lint; or if these simpler measures fail, the point of a pencil of lunar caustic should be introduced into the wound, so as to arrest the bleeding by mild cauterization. Leeches should be left to drop from the wound of their own accord, and should never under any circumstances be pulled away when engaged in drawing blood. By such a rash proceeding the little jaws or teeth of the animal may become detached and be left in the wound, where their presence may cause violent inflammation and other serious effects. The animal, after such an accident, is of course rendered totally unfitted for further use. Leeches are occasionally found to be somewhat obstinate in biting, and to secure their firm and proper adhesion the skin should be thoroughly washed, and any hairs growing on the part should be shaved off. The leech should be exposed to the air by being taken out of the water for a short time previously to its being applied to the skin. Where the ordinary application of the animal to the part fails to induce it to bite, it may be made to adhere by placing it under a wine-glass inverted over the spot, with the view of limiting its movements and of confining it to its sphere of operation; or if this fails, a spherical roll of paper opening by a small aperture at the bottom should be made, after the fashion of the paper-bag rolled on the fingers by shopkeepers; and into this bag the leech should be placed, with the mouth just protruding from the hole at the lower part of the bag. Its movements are thus more limited than in the previous case, and the mouth being alone exposed, the animal will almost certainly adhere to the skin against which it is applied. After detaching themselves, leeches are made to disgorge or reject the blood they have drawn by being placed in a weak solution of salt, or by having a little salt sprinkled over them. After disgorging the blood they should be placed in clean fresh water, and not used again for some time. The water in which leeches are kept should be changed daily at least. The chief sources of leech supply to the civilized world are Hungary and Central Europe generally and Russia. From these parts they are exported in immense quantities to Europe and America, packed in tubs amongst wet clay. As these forms appear subject during transit or when in use to epidemic sickness or disease, the leech-cargo requires careful attention, the dead and dying being removed, and the sick being carefully tended and separated from the healthy. Dr. Pareira's statistics of some years back give us the enormous number of 7,200,000 leeches as the annual import by four London dealers. Paris has been estimated to use 3,000,000 of these Annelides yearly, and other great cities of Europe and America will use equally large and proportionate numbers. Leeches are caught by peasantry of the districts in which they are found, who constitute a peculiar race of people known as

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'leech-gatherers.' They are taken by means of hand-nets, or by the gatherers wading into the water, and allowing the leeches to attach themselves to their naked limbs, the sharp bite of the leeches being dulled by long custom, and a peculiar art acquired by long practice serving to detach the little creatures from their hold. The medicinal species used by surgeons are two in number—the Green Leech (*Sanguisuga medicinalis*), which is of a dark olive colour; and the Speckled Leech (*Sanguisuga officinalis*), the under surface of which is spotted with black. The former species is principally northern in its distribution, the latter being found towards the south of Europe. America has nearly allied or identical species. Leeches appear to hybernate in winter, burying themselves in the mud at the bottom of the pools, and coming forth in the spring to assume their wonted life. The eggs are inclosed in a cocoon-like structure, formed by a gelatinous band, which is developed around the orifice of the reproductive organs. These cocoons are buried in the mud of their pools, and the young are developed within the cocoon in about ten days after the deposition of the eggs, although they do not leave the cocoon until about three weeks after being hatched. When they emerge from the cocoon they measure about ¼ inch in length, and undergo no metamorphosis before attaining their full-grown state. Although hermaphrodite, the leeches are incapable of self-impregnation, and the congress of two unisexual individuals is therefore necessary for the fertilization of the eggs.

LEECH, JOHN, an English artist, was born in London in 1817, and was sent at an unusually early age to the Charter-house School, where he remained eight years, during part of which time Thackeray was his school-fellow. On quitting school he commenced the study of medicine and surgery, and entered St. Bártholomew's Hospital as a student. There he remained until, yielding to his own inclination for art, he gave up his medical studies, and commenced drawing on wood for publication. The first of his important works were the illustrations to the Ingoldsby Legends. He joined the staff of Punch in 1841, his first sketch appearing in August of that year. In that field he worked with pre-eminent success, supplying weekly pictures of all sections of English life—scenes of field and forest, of the busy streets, of the rustic cottage and ale-house, and the elegant city dwelling and club; the huntsman, the swell, the injured paterfamilias; the fast young lady and her grave portly mother; the housemaid and her follower, &c., all thrown off with remarkable readiness and precision, showing no signs of carelessness even in mere trifles, but rather a steady growth in artistic power. Even in his strongest political cartoons he never overstepped the bounds of real gentlemanly feeling. He was an industrious worker, and probably ruined his not over robust constitution by too close application. He died suddenly on the 27th October, 1864, and was buried beside his friend Thackeray in Kensal Green Cemetery. His designs for Punch have nearly all been published separately as Pictures of Life and Character (five vols. oblong folio), and as Pencillings from Punch, consisting of his larger cartoons, chiefly political. He also executed the illustrations for Mr. Sponge's Sporting Tour, Ask Mamma, The Comic History of England, and other books.

LEEDS, a municipal and parliamentary borough and large manufacturing town of England, in the West Riding of Yorkshire, on the river Aire, which passes through the town towards its southern boundary, and is navigable from its mouth in the Humber, 185½ miles by railway from London. The Leeds and Liverpool Canal is in direct communication with the Aire. The town extends for about 7½ miles from east to west, and about 7 from north to south. Though great improvements have in recent times been effected by the widening of old and the building of new streets, much yet remains to be done in the way of opening up the more densely crowded localities and providing improved house accommodation for the working-classes. From the extent of the manufactures the town is naturally smoky, and on the whole its appearance is not prepossessing. Among the most conspicuous of the public buildings are the town-hall, opened in 1858 at a cost of over £140,000, and considered one of the finest municipal buildings in the kingdom. Its architecture is Roman Corinthian, and it forms a parallelogram 250 feet long by 200 wide, having over the principal entrance a clock-tower surmounted by a dome rising to the height of 225 feet. Opposite the south front is a fine bronze statue of the Duke of Wellington. The principal feature of the interior is the Victoria Hall, which is 161 feet long, 72 wide, and 75 high. The new municipal buildings are in a style of architecture akin to the Palladian, but freely treated. The greater portion of one wing is allotted to the Free Public Library. Leeds infirmary, a building in the Gothic style, was opened in 1868 at a cost of over £100,000. It is built on the pavilion system, that is, it consists of a number of detached blocks connected by corridors. It can accommodate 300 patients. The white and the coloured cloth halls are two very large buildings erected for the sale of woollens. The former, which is Italian in style, was erected in 1866–68, and is 382 feet long and 192 feet wide. These halls have practically fallen into disuse, the merchants now ordering their goods directly from the manufacturers. Other buildings deserving of notice are, the school-board offices, corn-exchange, the stock-exchange, the mechanics' institute and school of art, the Grand Theatre, the Leeds School of Medicine, the grammar-school, the Coliseum, &c., not to mention such other buildings as warehouses, banks, clubs, and hotels. Among the places of worship we may mention the parish church of St. Peter's, a cruciform structure in the early English style; St. George's, in the Perpendicular style, with a tower and spire 160 feet high; and Holy Trinity, a fine building in the early English style; some of the Dissenting places of worship, as well as the Roman Catholic church of St. Ann's, are handsome buildings. Besides the grammar-school and the mechanics' institute, already mentioned, there are also the Yorkshire College for technical education (large new premises for which are in course of erection), the Young Men's Christian Institution, a large training college for students for the Wesleyan ministry, a literary and philosophical society, and of course numerous schools of various kinds. The Public Libraries Act was adopted in Leeds in 1868, and there is now an admirable central library with several branches, the number of volumes exceeding 117,000. The charities and charitable institutions of Leeds are very numerous. It possesses a public park acquired by the corporation at a cost of £145,000. Throughout the town various pieces of land, which had long been left neglected, have been laid out by the corporation as recreation grounds. The water-works, which cover an area of upwards of 600 acres, and the gasworks, are the property of the corporation.

The progress of Leeds as a manufacturing town has been very rapid. It is and has been for generations the chief seat of the woollen manufacture of Yorkshire, there being no fewer than 135 woollen and shoddy factories, employing about 6000 hands, in Leeds. But whilst maintaining its pre-eminence in this respect Leeds has become the seat of other

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important industries. In linen manufacture several thousand hands are employed; in the iron-foundries, rolling-mills, tool and machine factories, about 9000 persons are engaged; whilst the boot and shoe factories engage about 1500 hands, and the leather trade employs a considerable number. The cloth cap trade is also becoming a great branch of industry, giving employment to over 3700 hands; and mention may also be made of the ready-made clothing workshops, tobacco manufactories, the extensive chemical and glass works, the important works for the making of drainage pipes, fire-bricks, &c. One of the great sources of the wealth of Leeds is its abundant supplies of coal and iron. The number of Yorkshire collieries worked in the Leeds district amounts to close on one hundred. Leeds is one of the oldest places in the north of England, having a history extending over a period of more than 1200 years. It is mentioned under the name of *Loid* or *Loidis* by the Venerable Bede as the capital of a small British kingdom about 616, and afterwards more fully in 655 as the chief place of a district of the same name in the Kingdom of Northumbria. The first charter from the crown to the borough of Leeds was granted by Charles I. in 1626, but this having been forfeited a second was granted by Charles II., which is the one under which the town is at present governed. Leeds had a representative in Parliament during the Commonwealth, but it was not made a parliamentary borough till the reform act of 1832. From that time till 1867 it returned two members to Parliament; under the act of 1867 it now returns three. The corporate body of Leeds comprises a mayor, 16 aldermen, and 48 councillors. It is an assize town, a parish, and a rural deanery in the archdeanery of Craven, diocese of Ripon. The vicinity of the town is crowded with villages, most of the inhabitants of which are employed in manufacturing for the Leeds market. The only object in the neighbourhood possessed of much interest is the fine ruin of Kirkstall Abbey. Pop. in 1871, 259,212; in 1881, 309,119.

LEEK (*Allium porrum*), a mild kind of onion much cultivated for culinary purposes. The stem is rather tall, and the flowers are disposed in large compact balls, supported on purple peduncles.

LEEK, a market town of Staffordshire, England, beautifully situated on an elevation in the valley of the Churnet, in the most picturesque part of the county, 28 miles south by east of Manchester. It has well-paved, lighted, and remarkably clean streets; some houses of rather an antique appearance, and many good modern buildings, several churches and chapels, a union workhouse, a grammar-school, a mechanics' institute, a dispensary, alms-houses, a cottage-hospital, and other charities. The staple industry is the manufacture of sewing silks and general silk trimmings, silk dyeing and printing, which employ about 5000 of the inhabitants. Pop. of urban sanitary district in 1881, 12,865.

LEEUWARDEN, a town, Holland, capital of the province of Friesland, in a fertile plain on the Ee, 70 miles north-east of Amsterdam. It is surrounded by a deep broad ditch and ramparts, which have been converted into a promenade; is intersected by numerous canals, and contains many well-built streets. The principal edifices are the palace, formerly the residence of the stadtholders of Friesland; the old Landhuis, several churches, a large and handsome town-house, the provincial court-house, general and orphan hospitals, the corn-exchange, civil and military prison, and an extensive and well-arranged house of correction. The chief industrial establishments are chicory, soap, and tobacco factories, breweries, distilleries, roperies, tanneries, boat-building yards, and saw, oil, cement, walk, and corn mills; and there is some trade in horses, cattle, hides, bones, and dairy produce. Pop. in 1879, 28,354.

LEEWARD, To, denotes towards that part of the horizon which lies under the lee, or whither the wind blows.

LEEWARD ISLANDS. See WEST INDIES.

LEFEBVRE, FRANÇOIS JOSEPH, Duke of Danzig, marshal and peer of France, &c., was born at Ruffach in Alsace, in 1755. He entered the military service in the Gardes Françaises, and at the revolution was sergeant. Having warmly embraced the new principles, and distinguished himself by his prudence and firmness, his promotion was rapid. In 1794 he was made general of division, and having subsequently made himself useful to Bonaparte, was rewarded by him with the dignities of senator, marshal of the empire, grand cross of the Legion of Honour. He bore an important part in the victory of Jena, distinguished himself at Eylau, and received the chief command at the siege of Danzig, at which he gave the most brilliant proofs of genius and humanity. In 1808 he served in Spain, in 1809 again in Germany, and in the Russian campaign commanded the imperial guard. After the abdication of the emperor the king created him peer, and during the Hundred Days he sat as a member of the upper chamber. After the second restoration he was excluded from it till 1819. He died September 14, next year.

LEFEBVRE, or LE FEBURE, NICOLAS or NICASIUS, a distinguished chemist, probably a native of France, and born about 1620. He was educated at the Protestant Academy at Sedan. He acquired a knowledge of chemistry and pharmacy from his father, an apothecary, after whose death he continued his studies with a doctor of medicine at Sedan, and subsequently at Paris with another physician. While here, he was elected by Vallot chief royal physician, to act as his majesty's apothecary and distiller, 'to perform by his precepts and order lessons and operations in a course of the true pharmacy, which is chymistry, and that in the garden which his majesty prepared in the suburbs of St. Victor.' Here Lefebvre found ample opportunity to pursue his favourite study. From his account, he would seem to have been the sole teacher of chemistry in the garden, and to have succeeded Davison (which see) in that post. In 1660, at Paris, appeared a work by him, entitled Traité de Chimie théorique et pratique, two vols. 12mo, which went through several editions, and was translated into German. About the year 1664 he was invited to London by Charles II. to take the post of royal professor and apothecary in ordinary to the household. He was also elected to the Royal Society, which had just been founded. In 1670 appeared a translation into English of his Traité, entitled A Compleat Body of Chymistry, in two parts 4to, prefixed to which is a dedication to Charles II. by the author, wherein he acknowledges the great honour he had enjoyed in being called to be one of his majesty's servants. He spent the rest of his life in London, and published in 1664 a Discourse on Sir Walter Raleigh's great Cordial. He died in London, 1674. His treatise on chemistry is compiled, according to his own account, from Van Helmont, Glauber, and Paracelsus, and is divided into the theory and practice of the art. The whole work is very well done, the author shows thorough familiarity with his subject, and his descriptions of apparatus, of substances, and of preparations are clear and systematic. There is, as might be expected, a certain amount of fancy in his hypotheses, and he now and again gives indications of a belief in sympathies and in the doctrine of signatures, which he derived from his models, but which at that time there was no means of avoiding. His work served as a model for those of succeeding

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chemists; especially for that of Glaser (which see), who replaced him in the Jardin des Plantes, and of Lemery (which see).

LEGATES (*Legati*), with the ancient Romans, were the assistants of a proconsul or proprætor in the administration of a province, and in the command of the army; also the higher officers, who commanded under the general-in-chief of any army. Of the papal legates there are several kinds. Among them the *legates a latere* have the highest rank, and are sent on particularly important missions to the principal courts. They are taken from the college of cardinals only. Legates who are not cardinals are called *nuntii apostolici*. If they are sent *cum facultate legati a latere*, their power is equal to that of a *legate a latere*.

LEGATION is used to signify the body of official persons attached to an embassy; hence, *secretary of legation*. *Counsellor of legation* (*Legationsrath*) is a title bestowed in Germany on certain officers connected with the ministry for foreign affairs. Very often, however, it is a mere honorary title conferred upon persons who never had any connection with politics. Formerly legation also signified a division of the States of the Church.

LEGATO (Italian), a word used in opposition to *staccato*, and implying that the notes of the movement, or passage to which it is affixed, are to be performed in a close, smooth, and gliding manner, each note being held till the next is struck.

LEGEND (*legenda*), the title of a book containing the lessons that were to be read daily in the service of the early Roman Catholic Church. The term legend was afterwards applied to collections of biographies of saints and martyrs, or of remarkable stories relating to them, because they were read at matins and in the refectories of cloisters, and were earnestly recommended to the perusal of the laity as proofs of the Roman Catholic faith. The Roman breviaries likewise contain histories of the lives of saints and martyrs, which were read on the days of the saints whom they commemorated. They originated in the twelfth or thirteenth century, and they contributed much to the extinction of the old German (heathen) heroic traditions. In the middle ages a collection of the lives of the saints was known by the name of Legenda Sanctorum, or Historia Lombardica. There is a celebrated collection, called the Golden Legend (Aurea Legenda), by Jacobus de Voragine, archbishop of Genoa, who died in the year 1298. It was translated into English by Caxton, and printed by him at the command of William, earl of Arundel, in 1483. This edition is now very rare, and highly esteemed by book-hunters. The work was subsequently twice reprinted by the translator. It was again printed in a magnificent style by Wynkyn de Worde in 1498, and again in 1512 and 1527. An edition of the original Latin by Grässe was published at Leipzig in 1845. But the most comprehensive and valuable work on the lives of the saints is that compiled by the Bollandists in the seventeenth and eighteenth centuries, and bearing the title Acta Sanctorum. As these histories were often nothing more than pious fictions, the name of a legend was given by the incredulous to all fables of a similar nature, to all fictions which make pretensions to truth. Valerius Augustinus, who was Bishop of Verona in the sixteenth century, in his work De Rhetorica Christiana, ascribes the numerous fables which have been ushered into the world under the title of legends, in part to the custom prevailing in many monasteries, of requiring the monks to write Latin paraphrases and dissertations on the most striking circumstances in the lives of the saints, in which they were allowed to ascribe to tyrants and persecuted saints such works and actions as they considered most adapted to their situation and character. This gave rise to those embellishments of history, which were preserved, and afterwards found in monasteries, and mistaken for true histories. Although many of the legends are tasteless and unmeaning fictions, the offspring of childish credulity, or intended to gratify it, there is also a large number of highly poetical and ingenious fables among them. Hence many poets have attempted to avail themselves of these rude materials, and to arrange them in the modern taste; and hence every poetical fiction in the style of ecclesiastical tradition, whether in verse or prose, is called a legend. Longfellow's Golden Legend has nothing to do with *the* Golden Legend, but is founded on a poem by Hartmann von der Aue, a minnesinger of the twelfth century. The principal characteristic of a legend is the miraculous, which should be of a religious nature, or relating to some traditions of the church, without, however, falling into frivolity. The legend is a production of Christianity, and, like the traditions of the church, wholly different from the *mythos*, or ancient fable. The style proper to it is plain and simple, such as would naturally flow from the gentle inspiration of a pious heart, and wholly inconsistent with ornament and poetical decorations.

Legend is also used for the motto or words engraved in a circular manner round the head or other figure upon a medal or coin. The meaning of this term is similar to that of *inscription;* but the latter refers chiefly to the writing placed in the middle of the coin, while the legend surrounds it.

LEGENDRE, ADRIEN MARIE, a famous mathematician, born at Paris in 1752, was early professor of mathematics in the military school there, and in 1783 became a member of the Academy. After doubts had arisen between the astronomers of England and France as to the exact positions of the observatories of Greenwich and Paris, he was in 1787 employed on the part of the French government, along with Cassini and Mechain, to measure a degree of latitude between Dunkirk and Boulogne, while English mathematicians did the same on the other side of the Channel. In 1808 Legendre was appointed by the imperial government councillor for life to the university; after the second restoration was made an honorary member of the public commission for education; and in 1816 examiner of those who took honours in the polytechnic school. Having refused to vote for the ministerial candidate in supplying a vacancy in the Academy, he was deprived in 1824 of a pension of 3000 francs which had been bestowed upon him. He died in 1833. He particularly distinguished himself by profound investigations as to the attraction of elliptical spheroids, and his method of calculating the course of the comets attracted great attention when it appeared, by the ingenuity and depth which characterized it. His best known work is his excellent Éléments de Géometrie (1794; new edition, with additions and modifications by Blanchet, 1845), which has been translated into English, and enriched with notes by Sir David Brewster. He is also the author of an Essai sur la théorie des nombres (1798), Nouvelle méthode pour déterminer l'orbite des comètes (1805), Exercices du calcul intégral, sur divers ordres de transcendantes et sur les quadratures (1811–19), Traité des fonctions elliptiques et des intégrales eulériennes (1827–32), &c., besides a large number of memoirs contributed to the Academy of Sciences. His works are as much distinguished by the perspicuity and elegance of their style, as by the fertility of invention which they display.

LEGHORN (Italian, *Livorno;* French, *Livourne*), a seaport town in the Kingdom of Italy, in the province of Livorno, on the extremity of a tongue of

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land which stretches into the Mediterranean, 12 miles S.S.W. of Pisa and 50 miles W.S.W. of Florence. Modern writers on ancient geography give it the name of Portus Liburni or Portus Herculis Liburni, but there is no authority in the writings of the ancients for either of these forms. It may possibly be the same as the ancient Labro, which is mentioned by Cicero as a seaport near Pisæ (Pisa). Some have thought that the ancient Portus Pisanus occupied the site of the modern Leghorn, but it seems more probable that it lay further north. Leghorn is built nearly in the form of a square, and is surrounded by modern walls with five gates. It is for the most part well built, its streets being spacious, regular, and well paved. The northern part of the town is called Little Venice, from the fact of its being intersected with canals. The chief objects of interest are the Duomo, originally only a parish church, but possessed of a façade designed by Inigo Jones, and adorned with paintings by Ligozzi, Empoli, and Cigoli; the church of the Madonna, with good pictures by Roselli and Il Volleranno; two Greek churches, a synagogue richly ornamented with marbles; the English chapel and cemetery (containing Smollett's tomb), the Dutch cemetery; a mosque, a ducal palace of little architectural merit, a marble statue of Ferdinand I. by Giovanni dell' Opera and Pietro Tacca; the lazarettos of San Rocco, San Jacopo, and San Leopoldo, all well-managed institutions and remarkable structures, particularly the last, which is one of the most magnificent works of the kind in Europe; the Torre de Marzocco, built of red marble, and so called from the Marzocco or lion by which it is surmounted; a theatre, a public library, and an aqueduct which supplies the town with water derived from the mountains of Colognole, 12 miles distant. In the Piazza Carlo Alberto there is a colossal statue of the Grand-duke Ferdinand III., and another of Leopold II. The manufactures consist chiefly of articles in coral, of which there is a valuable fishery; woollen and silk goods, straw hats and bonnets and plaited straw, glass, paper, soap, cordage, leather, starch, tobacco, preserved fruits, &c. Ship-building is carried on, and within recent years several iron-clads have been constructed in the dockyards. After the general peace of 1815 Leghorn, being a free port, rose rapidly in commercial consequence, and it has retained its prosperity since becoming a part of the Kingdom of Italy, and liable to the same dues as other ports of the kingdom. It ranks among the chief ports of Italy after Genoa and Naples. Its trade is principally carried on with the ports of the Levant and the Black Sea, and with the United Kingdom. The principal imports are cereals, colonial wares, yarns and woven fabrics of all sorts, pig and wrought iron, and coals; and the chief exports are oils, potash, borax, and tartar, besides dry vegetables, cheese, rice, cod, pepper, tea, wine, tobacco, wool, flax, dye-woods, linseed, lead, iron, steel, tin-plate, zinc, tin, sulphur, &c., which it imports for re-exportation. The exports of cattle, swine, and fowl to other parts of Italy, including Corsica and Malta, are also considerable. Formerly there was a great impediment in the way of the development of the port, consisting in the bad character of the harbour, which was small, ill-protected, and even impracticable for ships of large size; but this impediment has now been removed by the construction of a new harbour, protected by a long breakwater in the shape of a half-moon, against the wind, which in that quarter blows almost without intermission from the south-west; while another breakwater protects it on the north. The harbour is 656 yards long and 437 broad, and its greatest depth is 39 feet. There is a light-house erected on a rock in the roadstead, with a light revolving at a height of 305 feet above the level of the sea. About two-thirds of the shipping (according to tonnage) is carried on under foreign flags (chiefly English, French, and American). Leghorn is a town of comparatively recent origin, having been a mere fishing-village in 1421, when it came into the possession of the Florentines. During the fifteenth century repeated decrees were issued by the Florentine Republic, which desired to become a maritime power, conferring important privileges upon it; but in spite of all that was done it continued to be a place of no importance till the sixteenth century, when the privileges of the place were renewed by Alessandro de' Medici, the first duke of Florence, and increased (1548) by his successor Cosmo I., and again by Ferdinand I. in 1593. From that time Leghorn has steadily continued to increase in prosperity, although in 1742 it suffered greatly from earthquakes, and in 1804 from the yellow fever. Pop. in 1880, 96,937.

LEGIO FULMINATRIX. See THUNDERING LEGION.

LEGION, a body of troops, which in ancient Rome during its whole history formed the unit of the military organization, but which varied at different periods in strength, composition, mode of equipment, &c. Under Romulus it is said to have consisted of only 3000 foot-soldiers, 1000 from each tribe (the Luceres, Ramnes, and Tities); under the republic, down to the second year of the second Punic war (218 B.C.), it numbered from 4000 to 5000; from that date till the first consulship of Marius (107 B.C.) the usual number was from 5000 to 5200; and finally, from the last-mentioned date the full strength of the legion as a rule approached 6200, and sometimes exceeded that number. At all times down to the consulship of Marius, when the cavalry were separated from the legionary organization, there was a body of 300 equites or horsemen attached to the legion. After the division of the Roman people by Servius Tullius into six grades or classes, the legion contained none but citizens belonging to the five higher classes, and it was not till the first consulship of Marius (107 B.C.) that citizens of all grades without distinction were allowed to be enrolled. After the conclusion of the Social war (87 B.C.) the privilege was extended to nearly the whole population of Italy, and by an edict of the Emperor Caracalla, in the beginning of the third century A.D., to the whole Roman world. Even before this time foreigners had in fact been admitted into the Roman legion, and under Diocletian, Constantine, and later emperors, the best Roman soldiers were barbarians. From the overthrow of the monarchy and the establishment of the republic four legions were usually levied at a time, two of which were assigned to each consul. The unit of subdivision in the legion was the maniple, so called because the standard of this division consisted of a wisp or handful (*manipulus*) of hay on the top of a pole. In Livy we have a detailed account of the constitution of the legion at the time of the great Latin war (340 B.C.) It then consisted of seventy-five maniples, each of sixty men, besides two officers called centurions and a standard-bearer. The soldiers forming the legion were further divided according to their mode of equipment and their position when drawn up in order of battle into three classes—the Hastati, the Principes, and the Triarii. The hastati consisted of the younger levies, and were so called because they were armed with a light spear called *hasta*. They were divided into fifteen maniples, and in order of battle occupied the first rank, the maniples being drawn up separately with spaces between. The principes, at the time of which Livy speaks, occupied the second rank in order

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of battle, but they were named from the fact that they originally were drawn up in the first place. They were composed of men in the full vigour of manhood, all heavily armed. Like the hastati they were divided into fifteen maniples, and were drawn up behind the spaces left between the maniples of the first rank. Under the general name of triarii three different kinds of troops, all veterans, were known—the triarii proper, the rorarii, and the accensi. They were divided into forty-five maniples (fifteen to each of the three kinds of troops of which they were composed), and were drawn up in three lines of fifteen maniples each behind the spaces left between the maniples of the principes, the maniples of the rorarii and the accensi being drawn up immediately behind those of the triarii proper. The triarii proper were the best soldiers in the legion; the rorarii (named from the light missiles with which they were armed, and which they sprinkled like dew —Latin, *ros*—among the troops of the enemy), although also veterans, were inferior both in age and prowess; and the accensi were inferior to both.

The authority for the period of the wars of the younger Scipio is Polybius, who gives a minute account of the organization of a Roman legion at that time. There were then four kinds of troops in the legion—velites, hastati, principes, and triarii. The velites consisted of light-armed troops which acted as skirmishers. They were not drawn up separately, but were equally distributed among the divisions of the other three kinds of troops. When the legion numbered 4000 men, 1000 were velites, 1200 hastati, 1200 principes, and 600 triarii. When the legion was larger the first three classes were increased proportionally, but the number of the triarii, who were the picked men of the legion, was always the same. The hastati, principes, and triarii were each divided into ten maniples, and each of these maniples was composed of two centuries, one forming the right and the other the left wing of the maniple. One maniple from each of these three denominations, along with their complement of velites, formed a cohort; but this is a division of the Roman army not mentioned by Polybius. The cavalry of the legion, 300 in number, were divided into ten *turmæ* or troops. The chief change subsequently made in the Roman legion till the downfall of the republic consisted in the abolition of the old distinction of hastati, principes, and triarii, consequent upon an alteration in the method of drawing up the legion in order of battle. The troops were no longer drawn up in three lines of maniples, but in two lines in close order, each line consisting of five cohorts, the veterans being in front. Another important change was the substitution of foreign mercenaries skilled in the use of various weapons, such as Cretan archers, slingers from the Balearic Islands, and Moorish dartmen for the velites of former times. The cavalry also were now chiefly foreigners, the true Roman equites employed in the legion being few in number, and chiefly acting as aides-de-camp. They hence came to be regarded as distinct from the legion, and were formed into separate bodies called *alæ*. Under the empire the legions were almost exclusively raised in the provinces. They were as formerly divided into ten cohorts, but the first cohort, to whose care the standard of the legion was confided, was twice as numerous as any of the others.

The chief officers of the legions under the consuls were the military tribunes (*tribuni militum*), twenty-four of whom were elected at one time, six for each of the four consular legions. They were, in the earliest period of the republic, all nominated by the consuls, but were afterwards appointed partly by the consuls and partly by popular election. No one could be a military tribune who had not served ten years in the infantry or five in the cavalry, but this rule was not rigorously adhered to. The tribunes commanded in turn, each for two months at a time. The next officers under the tribunes were the centurions (*centuriones*), each of whom commanded half of a maniple. They were appointed by the commander of the army or by the tribunes. Each of them chose a lieutenant (*optio*) for himself, and out of each maniple the two centurions selected two of the strongest and bravest men to act as standard-bearers (*vexillarii signiferi*). Every legion had thus six tribunes, sixty centurions, and the same number of *optiones* and standard-bearers. The standard of the legion was an eagle, which was borne by the first centurion of the first maniple of the triarii.

LEGION OF HONOUR (*légion d'honneur*), an order instituted by Napoleon while consul, May 19, 1802, for military and civil merit. The proposition produced much debate in the legislative body, passed after a strong opposition, and was inaugurated 14th July, 1804. It was the object of Napoleon to kindle a spirit of ambition, the most necessary national element for the support of wars, of which he foresaw that it would be necessary for him to wage many, and for this purpose the institution was admirably calculated. The cross of the Legion of Honour was given to all who had previously received a military weapon as a mark of honour, and to a great number of new members. Its effect upon the soldiers was very great. After Napoleon's assumption of the imperial dignity the statutes received some modifications. The oath was originally as follows: 'I swear on my honour to devote myself to the service of the republic, to the preservation of the integrity of its territory, to the defence of its government, its laws, and the property by them consecrated; to oppose by every means which justice, reason, and the laws authorize, all acts tending to re-establish the feudal system, or to revive the titles and distinctions belonging to it; finally, to contribute to the utmost of my power to the maintenance of liberty and equality.' After Napoleon became emperor the form of the oath was changed. The members swore to devote themselves to the service of the empire, to the preservation of the integrity of the French territory, to the defence of the emperor, to the support of the laws and of the property which they had made sacred; to combat by all the means which justice, reason, and the laws authorized, every attempt to re-establish the feudal *régime*, and to concur with all their might in maintaining liberty and equality. The decoration consisted of a star containing the portrait of Napoleon, surrounded by a wreath of oak and laurel, with the legend, 'Napoléon, empereur et roi;' on the reverse was the French eagle with a thunderbolt in his talons, and the legend, 'Honneur et patrie.' The star of the *légionnaires* was of silver, that of the officers of gold, and was suspended from a red riband with a white margin. The order consisted of grand-crosses (*grand aigle*), who wore the cross on a broad riband hanging over the left shoulder, and a star on the left side of the breast; of grand-officers, who wore the cross in the button-hole, and a star, somewhat smaller, on the left side; of commanders, who wore the cross round the neck; of officers, who wore the gold cross with a bow in the button-hole; and of legionaries, who wore the silver cross with a simple riband in the button-hole. The legion was composed of sixteen cohorts, each of which had its seat in a different city, and contained 407 members; the whole number was therefore at first 6512. Each cohort had a chancellor, treasurer, and chief—the whole order a grand-chancellor and grand-treasurer. The pension of a grand-officer was 5000 francs annually;

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of a commander, 2000: of an officer, 1000; of a legionary, 250 francs. There was also an institution for the education of the daughters of members of the Legion of Honour at Écouen, and afterwards another in the old Benedictine convent at St. Denis, together with some secondary schools now suppressed. After the restoration of the Bourbons the order underwent essential changes. The head of Henry IV. was substituted for that of Napoleon, with the legend, 'Roi de France et de Navarre,' and on the reverse the *fleur-de-lis* took the place of the eagle. The grand-crosses were limited to 80, the grand-officers to 160, the commanders to 400, the officers to 2000; the number of the legionaries was left unlimited. New members received no pensions, whilst those of the old members exceeded the prescribed sum, but on the death of the old members the new ones were to receive their pensions. Foreign members received no pensions. It was evident that the Legion of Honour was coldly treated by the Bourbons, who restored the old orders. The members created during the Hundred Days were of course not acknowledged by the Bourbons; but in 1831 General Lamarque obtained their acknowledgment by a spirited speech in the chamber of deputies, for which they sent him a sword with an inscription. Military honours are paid to the members of the Legion. This ceremonial was not always strictly observed by the soldiery towards civilians, upon whom Louis Philippe profusely lavished the decoration. Among the first acts of Napoleon III. was the reconstitution of the order on an extended basis. By the act of 16th March, 1852, the Legion was to consist of an unlimited number of knights (*chevaliers*), who in four years may become officers, the number of whom was restricted to 4000. These may in two years be promoted to commanders, whose number was fixed at 1000; and again in three years be raised to grand-officers, 500; and finally to grand-crosses, 80, after an interval of five years. In all cases, however, a campaign year counts for two years. The headship of the order was vested in the emperor himself. A decree of the government of national defence, dated 28th October, 1870, suppressed the decoration of the Legion except for military services, but was allowed to fall in abeyance by the Versailles government. The present opinion, however, is against the profuse granting of the decoration of the order, which had latterly brought the institution into discredit, and the number of chevaliers is now restricted to 25,000, the officers to 4000, the commanders to 1000, the grand-officers to 200, and the grand-crosses to 70. The exercise of the rights and privileges of the Legion of Honour is suspended when a member becomes naturalized in a foreign country, or otherwise forfeits the rights of French citizenship.

LEGITIM, in Scotch law, is the legal share of the father's personal estate due to his children at his death. A father cannot disinherit his wife and children; when he dies, leaving a widow and children, his property is divisible into three equal parts: the widow's part, or *jus relictæ;* the children's part or legitim, equally divisible amongst all the children whether of his last or any former marriage; the remaining third, or *dead's part*, he may bequeath as he pleases, but if he makes no will, then it goes to the children as next of kin. If the father leave no widow then half is legitim, and the other half is dead's part; this is also the case if the widow in her marriage contract has renounced the *jus relictæ*. The children of a deceased child cannot claim any part of their grandfather's estate as the legitim to which their parent would have been entitled. In England and Ireland no such law exists, and the father may dispose by will of all his property to strangers.

LEGITIMATION, in Scotch law, is the rendering legitimate a person who was not born in lawful wedlock. This is effected by the subsequent intermarriage of the parents, or, as it is termed, *per subsequens matrimonium*. If, however, one of the parents was married to another person at the time of the birth the child will not be legitimated by the subsequent marriage. It was long an open question whether legitimation took place when another marriage intervened between the date of the birth and the intermarriage of the parents, but it has now been decided in the affirmative. It has not, however, been settled what are the mutual rights of the children of the two marriages in such cases, but it seems the legitimate children cannot be displaced by the legitimated bastard. If both the parents *bonâ fide* believed themselves to be married, although they were in reality not regularly so, the Scotch law holds the children legitimate. Legitimation *per subsequens matrimonium* is not recognized by the law of England or Ireland.

LEGUMIN, or vegetable casein, discovered in 1805 by Einhof, is a protein substance analogous to the casein of milk, but obtained from beans, pease, lentils, vetches, and other leguminous seeds. Powdered pease are digested in warmish water, or in cold water with a little alkali, and the liquor is allowed to stand for a day until matter in suspension has deposited. The clear solution is then precipitated carefully with dilute acetic acid, and the precipitate of legumin after solution in potash and reprecipitation by acetic acid is washed, first with weak, then with strong spirit, and fatty matters having been extracted by ether, the legumin is dried in a vacuum, over sulphuric acid. Legumin forms a flocky precipitate, and obtained by the preceding process is a dry earthy mass of a white or gray colour, which is easily reduced to powder. A solution of legumin in water does not coagulate on heating, but a precipitate is produced by an acid or by rennet. Legumin dissolves in excess of acid, and very readily in dilute alkalis, and also in certain alkaline salts. The aqueous extract of pease, in all likelihood, contains the legumin so dissolved. Legumin dissolves in sulphuric acid with a brown colour. When boiled for some time with it the legumin is decomposed, yielding leucine, tyrosine, and the usual products of similar protein substances. The average composition of legumin is carbon, 51·5; hydrogen, 7; nitrogen, 16·5; oxygen, 24·5; sulphur, 0·45; unless very carefully purified it contains a certain proportion of mineral matter, the chief ingredients of which are potash and phosphoric acid. A substance is got from almonds, and from the kernels of plums and cherries, which was formerly supposed to be identical with legumin. Certain differences, however, in composition and properties, show that the bodies are only analogous, and not identical.

LEGUMINOSÆ is the name given to a large natural family of phanerogamous plants, distinguished by papilionaceous flowers and fruit-pods, and containing a great number of genera, among which are beans, peas, vetches, robinia, lupines, broom, laburnum, &c. They are diffused over the whole world, from the equator to the poles, but become more numerous in proceeding from the poles to the tropics. They are valuable in respect of their varied and for the most part important uses in domestic economy, medicine, &c., and interesting, moreover, from the beautiful forms and colours of many of the genera. Their chief constituents are sugar, starch, a peculiar substance called *legumin;* gum, oil, balsamic juice, colouring and tanning matters, bitter extractive matter, a bitter purgative substance, called *cathartin* or *cytisin*, and lastly some narcotic matter.

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LÈH, or LE, the chief town of Ladak province, in Cashmere, in a fine open valley about 11,000 feet above sea-level, and 2 miles from the right bank of the Indus, 210 miles north of Simla. It is inclosed by a wall, which is crowned at intervals with conical or square towers, and continued on each side to the summit of the mountains. The streets are narrow and winding, but the houses, generally from two to three stories, are substantially built of stone or unburned brick, and being whitewashed, have a cheerful appearance. The principal buildings are the rajah's palace and several temples, all of very rich architecture. Lèh is the great entrepôt for the traffic between the Panjab and Chinese Tartary. One of the principal articles of trade is shawl wool from the latter. Population variously estimated from 4000 to 12,000.

LEIA, an important town of India, in the Panjab, on a small branch of the Indus, about 3 miles east from the main stream, 204 miles west-south-west from Lahore. It has a large amount of both direct and transit trade, and is, besides, the mart for the produce of the surrounding country, which is very fertile. The principal articles of sale are indigo, madder, sugar, silk, cotton, wool, iron, copper, glue, and grain. Pop. 17,000.

LEIBNITZ, or more correctly, LEIBNIZ, GOTTFRIED WILHELM, FREIHERR VON, one of the most celebrated scholars and philosophers that Germany has ever produced, was born in 1646 at Leipzig. His father, who was professor of jurisprudence in that city, died before his son had completed his sixth year. Leibniz attended the school of St. Nicholas, in Leipzig, till he was fifteen years old, when he entered the university of his native town, and although his principal study was ostensibly law, he paid particular attention to mathematics and philosophy, at that time taught by Jakob Thomasius. He passed one year at Jena, in order to avail himself of the instructions of the celebrated mathematician Ehrhard Weigel. After his return to Leipzig he studied the Grecian philosophy. He gave a splendid proof of his progress in his philosophical dissertation De Principio Individui, which he defended under Thomasius (1664), and which was followed by several legal treatises, for example, De Conditionibus (1665), and by a remarkable philosophico-mathematical treatise, De Arte combinatoria. In his twentieth year he presented himself to the legal faculty as a candidate for a doctorate, but was refused on account of his youth, and received his degree at Altorf. He was offered the place of professor extraordinary of law in that university, but he preferred going to Nürnberg, where there were many distinguished men. The Freiherr von Boyneburg, minister to the Elector of Mainz, having become acquainted with him, withdrew him from a society of alchemists in that city, with which he had connected himself, and promising him a place in the service of the elector, induced him to fix himself at Frankfort-on-the-Main. Here appeared, in 1667, his Nova Methodus discendæ docendæque Jurisprudentiæ, which is remarkable for its clear, and, at the same time, profound views, and which, at the request of his patron, was soon followed by a treatise in which he endeavoured to prove to the Poles that it was for their interest to elect the prince of Neuburg king in preference to any of the other candidates. At the suggestion of Boyneburg he was now named an electoral councillor and chancellor of justice; but this business could not satisfy a mind thirsting for knowledge. He continued his literary labours, and published his Theoria Motus abstracti, and Theoria Motus concreti (1671—two physical inquiries, remarkable only for the boldness of their views), and also his Sacrosancta Trinitas, per nova Argumenta logica defensa, a work directed against the attacks of the Pole Wissowatius, on the doctrine of the Trinity. In the meantime the literary splendour of Paris had attracted his attention, and he willingly undertook to accompany the young Boyneburg thither (1672). The distractions of this capital did not draw him from his studies. He applied himself particularly to mathematics, and enjoyed the acquaintance of the celebrated Huygens, whose expectations he answered by the invention of an arithmetical machine, similar to that of Pascal. His patron, Boyneburg, died in 1673, and Leibniz, who had nothing to detain him longer in Paris, declined the place of pensioner in the Academy, as it would have been necessary for him to embrace the Catholic religion, and went to England, where he became acquainted with Wallis, Bayle, Oldenburg, and Newton, and was elected a member of the Royal Society. He then applied to the Duke of Brunswick-Lüneburg, who gave him the office of councillor, and a pension, with permission to extend his residence in foreign countries at his pleasure. Availing himself of this permission he returned to Paris, where he spent fifteen months, devoted entirely to mathematics, and then returned by the way of England and Holland to Hanover, where he arrived 1676, and immediately entered upon the superintendence of the library, which was his principal duty. Here he soon published his treatise De Jure Suprematus ac Legationis Principum Germaniæ, and laboured with great zeal to effect the publication of the Acta Eruditorum. On the death of the Duke of Brunswick, his successor commissioned Leibniz to write the history of his house. In order to consult the documents necessary for that purpose Leibniz went (1687) to Vienna, and (as the old counts of Liguria, Tuscany, and Este were sprung from the same source as the house of Brunswick) thence to Italy. The three years which he spent in making these tours of investigation supplied him with an immense mass of diplomatic and political materials, the smallest portion of which appeared in the work he had undertaken; the remainder was published in 1693 and 1700, under the title Codex Juris Gentium diplomaticus, and Mantissa Codicis. At the same time he employed himself in arranging the materials which he had collected for his historical undertaking, and after having published an essay on the connection between the houses of Brunswick and Este, which procured him the appointments of privy-counsellor of justice and historiographer, he gave to the world (1707–11) Scriptores Rerum Brunsvicensium (three vols. folio). But this important work was only a preparatory step. The history itself was never published; the outline only was found among his papers after his death, and published in the Acta Eruditorum for 1717. According to this plan we should have had a general account of the primitive condition, not only of Germany, but of the whole world, in conformity with the views given by Leibniz in his Protogæa. (See the Acta Eruditorum for 1693.) The Accessiones historicæ, and the Disquisitio de Origine Francorum, were published at Hanover in 1715. As Leibniz displayed a profound knowledge of history in the above-mentioned works, so he showed a no less intimate acquaintance with theology, in his attempts at forming a plan for reuniting the Protestants and Catholics, in which he spent much fruitless labour, in conjunction with Molanus and Bossuet. Among his plans for the good of mankind may be mentioned his exertions to invent a universal character and a common philosophical language (*pasigraphy*). The Elector of Brandenburg (afterwards Frederick I., king of Prussia) requested his advice in the establishment of the Royal Academy of Sciences at Berlin,

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and when the institution was completed according to his plan the elector made him president of the Academy (1700). Leibniz furnished a great part of the papers in the Miscellanea Berolinensia, which the new Academy published in 1710. On the death of the king, three years after, his successor having little taste for the sciences, Leibniz foresaw the fall of the society, and therefore hastened to Vienna to obtain for it the protection of the Emperor Charles VI. His efforts were unsuccessful, although he got a most flattering reception from the emperor, who had already conferred on him the dignities of baron and of aulic counsellor, with a pension of 2000 florins. He also had an interview with the Czar Peter at Torgau (1711), who, in return for his advice concerning the civilization of his vast empire, conferred on him the title of privy-counsellor, with a pension of 1000 roubles. Loaded with honours, he crowned his literary fame by his celebrated Essai de Théodicée (1710), in which he maintained the doctrines of pre-established harmony and optimism, and which was followed by his Nouveaux Essais sur l'Entendement humain. His unfortunate controversy with Newton concerning the discovery of the differential calculus, and the pains of the gout, imbittered the close of his active life. He died in his seventieth year, Nov. 14, 1716. He was never married.

The principal metaphysical speculations of Leibniz, which, however, he never elaborated into a complete system, are contained in his Théodicée, Nouveaux Essais, Système nouveau de la Nature, De Ipsa Natura, Monadologie, and in portions of his correspondence. He controverted Locke's rejection of innate ideas. There are, according to Leibniz, in philosophy as well as in mathematics, necessary truths which cannot be learned from experience, and which rest upon principles the proof of which is independent of the senses. Those necessary truths are innate in the soul, not, indeed, actually forming objects of knowledge, but capable of being called forth by circumstances. Whatever is derived from the senses is confused, and distinct knowledge is possessed only by the understanding. In order to attain truth it is necessary to use the rules of logic, as mathematicians also use them, by unfolding, analytically, the simple truths contained in a subject, until the fundamental truth is attained. The Cartesian criterion—clearness and distinctness—is not sufficient. 'Our conclusions,' says Leibniz (Op. ii. 24), 'rest on two great principles—the principle of contradiction (according to which we deem that false which involves a contradiction, and that true which is opposed to falsehood), and the principle of the sufficient reason (which teaches that no assertion is true if no sufficient reason can be given why it is true rather than false), which leads to an absolute final reason, independent of accidental circumstances. But the final reason of the certainty of innate necessary truths is in God, as the source of all necessary and eternal truth. Monadology forms the central point of the system, and Leibniz believed that in this he had discovered the fundamental basis of actual knowledge. All experience teaches us that there are compound substances; consequently there must be simple ones. The senses give us only confused, the understanding distinct, knowledge; and the simple, which cannot be recognized by the senses, is the ground of the compound. These simple substances, from which the compound are formed, and each of which differs in its qualities from all others, since there are no two things exactly alike, Leibniz calls *monads*, of which he assumes four sorts—pure monads (or living beings), the souls of beasts, the souls of men, and God, who, as the origin of all knowledge, of reality, and of the existence of things, the eternal, original Monad, he calls the *Monas monadum*. All created monads are united with bodies, or, rather, all finite beings are aggregates of monads, some having a central and governing monad. The different classes of monads conceive of the universe with different degrees of distinctness: God alone conceives it perfectly. There is no actual influence (*influxus physicus*) of one thing on another, but only an ideal connection; that is, the internal changes of each monad are so arranged as to agree with the changes in the monads immediately connected with it. The cause of this agreement is the infinite wisdom and almighty power of the Deity. The divine understanding is the prototype of all truth, beauty, and absolute good, and by it all the interior changes in the monads were so predetermined that there is a perfect harmony in their succession. This predetermination or established harmony was arranged by the Godhead when the plan of the world was formed. The Theodicea is the defence of the supreme wisdom of the Creator of the world, which had been impugned on account of the existence of evil. Such a Theodicea Leibniz attempted, particularly on account of the contrary views brought forward by Bayle. According to the Leibnizian system, an infinite number of worlds are possible in the divine understanding; but of all possible ones God has chosen and formed the best. Everything which really is is best in connection, even if by itself it is imperfect. This system is therefore denominated *optimism*. Each being is intended to attain the highest degree of happiness of which it is capable, and is to contribute, as a part, to the perfection of the whole. The existence of evil is no argument against this system, because metaphysical evil is merely a necessary imperfection in the nature of finite things, from which imperfection physical evil (suffering) and moral evil (sin) necessarily proceed. Moral evil is founded in the freedom of finite spirits, which consists in choosing, according to grounds of preference, one among many physically possible actions; for although everything in the world is necessarily determined, still man, being ignorant of the future, must act from the convictions of his reason. The want of a logical and connected statement of the philosophy of Leibniz was supplied by his disciple Christian Wolff.

Leibniz early directed his attention to mathematics, and attained to great eminence in this science. Authorities seem generally agreed that he discovered the differential calculus independently of any knowledge of Newton's method of fluxions, so that each of these great men in reality attained the same result for himself. In a letter dated June 21, 1677, he communicated his discovery to Oldenburg for Newton's examination. Leibniz, however, received no answer from Newton to this remarkable letter, and things remained in this state till 1682, when the Acta Eruditorum was commenced. Leibniz was from the beginning one of its most active contributors, and in the October number of 1684 he published a complete account of his differential calculus, exactly as he had communicated it to Newton. It is worthy of remark that at this time no one questioned the claims of Leibniz to the discovery of this new mode of calculation. On the contrary, Newton publicly acknowledged the merit of the German, and made the most honourable mention of him in his Principia. Leibniz continued, with untiring activity, to make improvements in his method. The differential calculus, together with its converse, which Leibniz called *summatory*, but to which John Bernoulli gave the name of *integral calculus*, was in high esteem on the Continent, and had been much used and extended, both by Bernoulli and the Marquis de l'Hôpital, when, in 1699, twenty-two years after the letter of

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Leibniz to Newton, which was dated June 21, 1677, and fifteen years after the publication of the theory in the manner already mentioned, in the October (1684) number of the Acta Eruditorum, it was contended for the first time, by Fatio de Duillier, that Newton was the discoverer of this mode of reckoning. This article was written in an offensive tone, and Leibniz answered it in the Acta Eruditorum. His reply for a time put an end to the dispute; but five years afterwards (1704), Newton having published his Optics, at the close of which he appended an exposition of his method of fluxions, which he claimed to have invented as early as 1666, the Acta Eruditorum gave an extract from this work in the next year, and by making a comparison between the method of fluxions and the system of differential calculus, to the disadvantage of the former, awakened anew the dispute between the parties. Keill, professor of astronomy at Oxford, declared in the Philosophical Transactions for 1708 not only that Newton was the original inventor of the new system, but that Leibniz had formed his upon Newton's merely by changing the expressions and the signs. Leibniz therefore wrote to Hans Sloane, secretary to the Royal Society, to request the society to decide between him and Keill. The society immediately named a committee, who came to the conclusion that in reality there was no difference between the differential calculus and fluxions, and that the question did not turn on the invention of the one or the other, but on priority, with respect to which there was strong proof that Newton had possessed the system fifteen years before the publication of Leibniz's article in the Acta Eruditorum, and that, therefore, Keill's assertion concerning Leibniz could not be considered as a calumny. This decision of the society only rendered the schism between the parties wider; and Leibniz rendered the quarrel irreconcilable by sending a letter to the Abbé Conti, who was then in England, and acted the part of a mediator between the parties. In this letter, which was intended to be shown to Newton, among other offensive expressions he gave him to understand that it was impossible that he should have invented the algorithm of infinitely small magnitudes before himself. Newton replied through Conti; and the dispute continued till the death of Leibniz, and altogether embittered his latter years.

The first edition of his works was published by Dutens under the title of Leibnitii Opera omnia (Geneva, 1768, six vols. 4to). In Dutens' edition, however, all those philosophical works are omitted which Raspe had published (Amsterdam, 1760, 4to) under the title Œuvres philosophiques de M. Leibniz. One of the most recent and the most complete editions was published by Didot (Paris, 1859, and following years). The best biography is by Guhrauer (two vols. Breslau, 1842; with additions, 1846).

LEICESTER, an inland county of England, bounded on the north by the counties of Nottingham and Derby, on the west by Derby and Warwick, on the south by Northampton, and on the east by Rutland and Lincoln; area, 511,907 acres, almost all of which is arable land, meadow, and pasture. The surface is varied and uneven, but possesses no bold features. The county is nearly equally divided geologically by the lias and sandstone formations; the former occupying the greater portion of the east, the latter of the west side. The coal formation exists to a considerable extent on the west, and the clay-slate in Charnwood Forest. Besides coal, limestone, gypsum, slate, granite, whetstone, and clay are among the chief mineral productions. The principal river is the Soar, which flows through the centre of the county. Nearly two-thirds of the county are in permanent pasture, the greater proportion of which is on the lias formation, the corn-lands being chiefly on the sandstone. Along the banks of the streams the pasture is devoted to the fattening of stock, or for meadows; while on the higher and colder land it is chiefly applied to dairy-farming and the production of cheese, some of which is of the kind called Stilton. Barley and wheat are the principal crops, but oats, turnips, mangold, and beans are all extensively cultivated, and produce excellent crops. The Leicestershire sheep consist principally of the old and the new Leicesters, and the Charnwood or forest breeds. They all produce long-combing wool. The total area of the county of Leicester under crops, bare fallow, and grass, in 1882 was 473,650 acres, of which 89,987 acres were under corn crops, 22,481 acres under green crops, 26,518 under clover and grasses in rotation, and 318,935 in permanent pasture. The number of sheep was 251,497, of cattle 126,493. Leicester is one of the great seats of the stocking manufacture, which is carried on in all the towns and villages of the county. Silk-plush for hats, lace, agricultural implements, pottery, and fire-bricks are also made here. Owing to the openness of the country Leicester has long been famous as a fox-hunting county, Melton-Mowbray being the headquarters of the sportsmen during the season. Leicester returns six members to Parliament, four for the county and two for the borough of Leicester. Principal towns —Leicester, Loughborough, Market-Harborough, Ashby de la Zouch, and Hinckley. It is intersected by numerous railways and canals. Pop. 321,258.

LEICESTER, a municipal and parliamentary borough and market-town, England, capital and near the centre of the above county, 88 miles N.N.W. of London, at the intersection of several railway lines, on the right bank of the Soar, here crossed by a handsome modern and three ancient bridges. The more important public buildings are the church of All Saints (restored 1875), with an ancient font, a curious clock, and fine wood-carvings; St. Margaret's (also recently restored), a large and beautiful structure of the fifteenth century, surmounted by a lofty tower with a fine chime of bells; St. Martin's (restored in 1862), cruciform, with a tower rising from its centre, and terminating in a spire; St. Mary's, dating from 12th century (restored 1861), with a tower and lofty crocketed spire and roof; St. Nicholas', a very ancient Gothic church; St. George's, a handsome modern structure with a fine tower and spire 170 feet high; the municipal buildings (opened in 1876), with lofty clock-tower, and fine public square with fountain; the guild-hall, the public library and news-room, the court-house, county-rooms, assembly-rooms, theatre, lunatic asylum, county hospital, and county and borough jails. The educational establishments include the Wyggeston Hospital, boys' and girls' public schools, a school of design, and board and other schools; and among the more important benevolent institutions are Trinity and Wyggeston's Hospitals, a female asylum, and various other charities. The chief literary associations are a literary and philosophical society, with a good museum, and a free library. The staple manufactures are cotton and worsted hosiery, elastic-webs, ironware, and boots and shoes. The other manufactures are shawls, lace, ropes and twine, thread, needles, pipes, cigars, and stocking-frames. The trade is greatly facilitated by a canal communicating with various lines of navigation, and more especially by railway. Markets and cattle sales are held twice a week; and fairs, chiefly for horses, cattle, and sheep, twelve times a year. Leicester is a place of considerable antiquity, and was known to the Romans under the name of Rate. A variety of Roman remains have been found in it at various

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times, and some so recently as 1873. Under the heptarchy it formed part of the Kingdom of Mercia; and in 874 was seized by the Danes, who made it one of their five chief cities, and retained possession of it till Ethelfleda, daughter of Alfred the Great and widow of the Duke of Mercia, expelled them with great slaughter. It was afterwards surrounded by walls, and defended by a strong castle, both of which were demolished in the reign of Henry II. It suffered severely during the wars of Lancaster and York, and also during the Parliamentary war, having in the latter been first taken by storm by the royalists, and then retaken by the republicans. It sends two members to Parliament. Pop. in 1871, 95,084; in 1881, 122,376.

LEICESTER, Earl of. See Dudley (Robert).

LEIDENFROST'S PHENOMENON was observed by Leidenfrost and investigated by Boutigny. When a drop of water is thrown into a red-hot platinum dish it takes a flattened spheroidal shape, rolls about, rotates and may exhibit ripples on its surface, and separates itself from the bottom of the dish by a cushion of steam. This cushion of steam, by its non-conductivity, prevents the water from attaining the temperature of the plate, so that the water is only heated by radiation: hence it does not boil, but evaporates slowly at its under surface, and remains at a temperature somewhat lower than 100° C., its boiling-point. All the heat it receives is expended in the slow evaporation. Boutigny termed this the *spheroidal state* of water. As the dish cools the evaporation becomes more rapid, until, when the dish has a temperature of about 200° C., the water spreads out and boils violently. If the red-hot dish is not quite smooth, as when it is of copper, bubbles of steam may be seen passing through the water. Using a small thermometer, or a thermopile, the temperature of the drop of water is found to be about 95° C.; the temperature of any liquid in the spheroidal state is lower than its boiling-point. The lowest temperature of the plate is about 200° C. for water, and 61° C. for ether, being less for more volatile liquids. M. Boutigny poured liquid sulphurous acid (boiling-point −10° C.) into a white-hot platinum dish; the evaporation was very slow, and the liquid was so cold (−11° C.) that water poured upon it was instantly converted into ice. Mercury may be frozen by pouring it upon some liquid nitrous oxide (boiling-point −70° C.) in the spheroidal state. When a wire from a voltaic battery is placed in the water, and the dish is connected with the battery through a galvanometer, the separation between the water and the plate prevents a current from passing until the plate cools to 200° C. When a drop of dark-coloured water is thrown on a flat red-hot plate, the flame of a candle placed behind may be distinctly seen between the drop and the plate. Moreover, a drop of nitric acid, or of sulphide of sodium, assumes the spheroidal state on a red-hot plate of silver, and does not act upon the silver chemically so long as the plate is red-hot. The ripples on the surface of the liquid are probably caused by the evaporation from its under surface. When a red-hot ball of platinum is dropped into water it remains for a short time separated from the liquid by a coating of steam. Drops of melted sugar are heavier than water, yet when thrown on water they float for a short time, being prevented from sinking by a cushion of steam. The hand may be rapidly passed through melted lead or iron with impunity, being protected from the metal by a coating of steam. The natural moisture of the hand protects it sufficiently, but it is better to wipe with a damp cloth. It is probable that many boiler explosions have been caused by the metal plates acquiring so high a temperature that the water assumes the spheroidal state, so that when the plates become cool enough there is an instantaneous violent generation of steam.

LEIGH, a market and manufacturing town, England, in the county of Lancaster, 13 miles west from Manchester, with which and with Bolton (7½ miles distant) it is connected by railway. The town has been rising rapidly into importance within recent years. It has extensive manufactures of cotton, silk fabrics, glass, ironware, and agricultural implements, and near it are extensive collieries. Pop. (1881), 14,436.

LEIGHTON, Robert, a distinguished Scotch prelate, was born in Edinburgh, or according to other authorities in London, in 1611. He was educated at the university of the former city, and in 1631 took his degree of M.A. He then spent about ten years on the Continent, residing for a good part of that time at Douay. On his return to Scotland in 1641 he became pastor of the parish church of Newbattle, near Edinburgh. Disapproved of by his ecclesiastical brethren as not being sufficiently polemical in his discourses, he resigned his living in 1652, and in the following year was chosen principal of the Edinburgh University. On the accession of Charles II. an attempt was made to establish Episcopacy in Scotland. Although Leighton's father had been savagely persecuted by Laud for his opposition to this religious system, Leighton accepted, though reluctantly, a bishopric, in the hope of moderating the violent dissensions of the time, choosing that of Dunblane, as being the smallest and poorest in revenue. The despotic conduct of Sharpe and Lauderdale deeply grieved him, and on two occasions (1665 and 1669) he went to London to implore the king to moderate the offensive zeal of his satellites, declaring on the first occasion that he could not consent to the planting of the Christian religion itself in such a manner, much less a form of ecclesiastical government. The king made several promises, but nothing was really done. In 1670, on the resignation of Dr. Burnet, Leighton was transferred to the Archbishopric of Glasgow, a dignity he accepted only on the conditions that he should be backed by the court in his attempts to carry out a liberal measure for the comprehension of the Presbyterians. Sharpe and his party, however, were allowed to treat the Presbyterians with the same high-handed tyranny as before, and Leighton could no longer remain an accomplice of such intolerant oppressors. In 1673 he went to London, and resigned his see. After a short residence in Edinburgh he removed to Broadhurst, an estate in Sussex belonging to his sister Mrs. Lightwater. Here he remained for ten years. He died in London, 1st February, 1684. He was celebrated for his learning, integrity, gentleness, and disinterestedness. Although his bishopric yielded only £200, and his archbishopric barely £400 per annum, he founded exhibitions in the colleges of Edinburgh and Glasgow. The most complete edition of his works, with Life, was published in six vols. 8vo (London, 1808). Most of the aphorisms of Coleridge's Aids to Reflexion are taken from Leighton.

LEIGHTON-BUZZARD, a market town, England, in the county of Bedford, 18 miles south-west of the town of that name, on the right bank of the Ouse. It has a market-house, corn-exchange, an elegant old pentagonal cross, a spacious cruciform church in the early English style, with a tower surmounted by a spire; a new church built in 1866, with several Dissenting places of worship. Some trade is carried on in timber, iron, lime, brick, corn, and other articles. A portion of the female population are employed in lace-making and straw-plaiting. Pop. 5991.

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LEINSTER, a province, Ireland, having on the south and east St. George's Channel and the Irish Sea, on the north Ulster, and on the west Connaught and Munster. Its length, north to south, is about 132 miles; its greatest breadth, which is near the centre of the province, is 82 miles; it comprises 4,876,933 acres, or about 7620 square miles. The province is divided into twelve counties—Wexford, Kilkenny, Carlow, Wicklow, Dublin, Kildare, Queen's County, King's County, Westmeath, Longford, Meath, and Louth. Leinster is the most favoured by nature of the four provinces of Ireland, having regard to the fertility and vast extent of its tillage and pasture lands, its wealth in minerals, and its diversified scenery. It is in general also well cultivated, about 1,400,000 acres being under tillage, and about 2,600,000 acres in pasture. Its coast, however, has fewer good harbours than any of the other provinces. Principal rivers—the Boyne, Slaney, Barrow, Liffey, Nore, and May. Pop. in 1881, 1,278,989.

LEIPA (Böhmisch), or Leippa, a town of Bohemia, in the circle of Leitmeritz, 43 miles N.N.E. of Prague. It is substantially built, has several churches, one of them a very ancient, and another a handsome modern structure; an Augustine monastery, a gymnasium, a superior German and several other schools; extensive manufactures of chintz, cotton, glass, and earthenware, and a trade in cattle. Pop. 9372.

LEIPOA, a genus of gallinaceous birds of the family Megapodidæ, of which the only known species is the *Leipoa ocellata* of the naturalists, the *ngow-oo* of the aboriginal Australian, and the native pheasant of the colonists. The bird is a native of Australia, is of the size of a very small turkey, and, like the Australian jungle-fowl, constructs mounds of sand or earth in which to lay its eggs. The eggs are about three times as large as those of a common fowl, and are esteemed as food; ten or twelve are often found in a nest, and the fortunate finder falls into a sort of little property, as the leipoa will suffer her nest to be robbed repeatedly, and lay over and over again. When startled the leipoa generally tries to escape by running, never taking to the wing until absolutely compelled. When surprised where the ground is tolerably open it is easily run down, but it is hopeless to pursue it if the bush be thick. It has a dark-brown crested head; neck and shoulders dark ashen gray; the front of the neck and upper part of the breast are covered with long black-pointed feathers, each having a white stripe along its centre. The primary feathers of the wings are dark-brown, with some sharply-toothed lines near the tip, and the other feathers of the wings, together with those of the back, are marked near their extremities with three bands of grayish-white, brown, and black, forming a series of eyes upon the feathers. The under surface is buff, and the tail and legs blackish-brown.

LEIPZIG (Latin, *Lipsia;* English, *Leipsic*), the second city of Saxony, capital of the circle of the same name, and one of the chief seats of commerce in Germany, 64 miles W.N.W. from Dresden. It lies in an extensive and fertile plain on the Elster, here joined by the Pleisse and Parthe, and consists of an old central town, formerly surrounded by fortifications, which have been converted into beautiful walks and shrubberies called the Promenade, and extensive and rapidly-increasing suburbs. In the central town the houses are mostly lofty, some of them quaint-looking; the streets are narrow, but generally straight and clean; the principal ones open into the market-place or square, which has a very picturesque appearance, the town-hall (Rathhaus), built in 1556, being on the one side, and the others being partly occupied by buildings in the renaissance style. The other principal buildings within the old boundaries, but none of which are architecturally remarkable, are the churches of St. Nicholas, St. Thomas, St. Paul, and St. Peter; the Augusteum, an elegant modern edifice containing the university; the booksellers' exchange, used during the fairs for the arrangement of accounts between the country houses and their agents and correspondents in Leipzig, and at other times for exhibitions of paintings, &c.; the cloth-hall (Gewandhaus); the town-school (Erste Bürger-Schule), with a collection of antiquities; the theatre and the Pleissenburg or castle, now partly used as a barrack: it formed part of the old fortifications, withstood the attacks of Tilly, and is memorable as the scene of the famous Leipzig disputation between Luther and Dr. Eck, though the portion of the building in which that interesting event took place is understood no longer to exist. Not far from the Pleissenburg, and in the centre of the Königsplatz (King's Place), is a colossal statue of King Frederick Augustus, who died in 1827. The suburbs are composed of lofty, elegant, and sometimes rather pretentious-looking buildings, laid off in regular streets, interspersed with gardens, possessing altogether, in like manner with the central town, an air of substantiality and comfort. They contain the elegant post-office buildings, the church of St. John, and the Roman Catholic church in the modern Gothic style, in some respects the finest building in the city; the Rosenthal (Valley of Roses), a favourite summer's evening resort composed of pleasant wooded walks; and numerous gardens and such-like places of recreation. Besides the university library Leipzig possesses a large and valuable town library. The university, founded in 1409, is the second in importance in Germany (that of Berlin being first), and in 1882 had a teaching staff of about 170 members, divided into professors, extraordinary professors, and *Privatdocenten* (lecturers), with over 3100 students. Schools of various kinds are numerous and good, including three gymnasia, an academy of designing, painting, architecture, &c.; a conservatory of music, and a commercial school, both, but especially the former, of considerable celebrity; several charity-schools, &c. There are a number of learned societies, a botanic garden, several hospitals, including one for deaf-mutes; and numerous baths.

Besides being the centre of the book and publishing trade of Germany, Leipzig possesses considerable manufactures, as of cotton stockings, leather, hats, silken and half-silken goods, soap, sealing-wax, tobacco, and numerous minor articles; it has likewise an extensive wool-spinning establishment. Leipzig is still more important for its commerce, carried on especially through its three noted fairs at the New-Year, Easter, and Michaelmas, the two last being the most important. To these fairs are congregated people from all quarters of Europe, from Asia and from America, in numbers often equalling that of the entire population of the town. Every house and yard is converted into a place of business; and the central market-place, the main streets, and a large portion of the Promenade are covered with booths of dealers in porcelain, Bohemian glass, lace, linens, domestic and heavy cloths of all kinds, tobacco, pipes, leather, shoes, jewelry, hardware, furs, and other articles too numerous to specify; but the more important portion of the business is transacted in the premises of the many agents of manufacturing houses, both German and foreign, who, either permanently or temporarily, are located here. Goods considerably exceeding the value of £10,000,000 change hands at these fairs, of which £1,200,000 are for books. Though for a time on the wane, the fairs in recent years have been rapidly increasing.

Leipzig is the capital of one of the four circles of

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Saxony, and the seat of several courts of justice. It is of Wendish origin; was destroyed by the Bohemian Duke Wratislav in 1082; and after being walled it was again destroyed by Otto IV., in 1212; and 400 houses were burned down in 1420. It early received the Reformation; in 1519 the disputation between Luther, Eck, and Carlstadt took place in the Pleissenburg. In 1631 Gustavus Adolphus defeated Tilly near it at Breitenfeld. In 1680–81 the plague carried off 3000 people. After this its commerce increased, its fairs became more important, and the seat of the book trade was transferred to it from Frankfurt-on-the-Main. It suffered much from the Seven Years' war, but soon recovered. October 16–19, 1813, the great 'battle of the nations' (Völkerschlacht) was fought around and in Leipzig, by which Germany was freed from the French yoke, and in which Napoleon received his first decisive defeat, at the hands of the combined forces of Prussia, Russia, and Austria. The French on this occasion lost 25,000 men as prisoners, besides a larger number slain in battle or drowned in attempting to cross the Elster. Excepting some political outbreaks in 1830, 1831, 1848, and 1849, the most important events in recent times are the founding and opening of the different railways, of which there are five. Pop. in 1880, 149,081.

LEIRIA, a town of Portugal, province of Estramadura, in a fertile district near the right bank of the Liz, 39 miles S.S.W. of Coimbra. It is walled and defended by an old castle, crowning a commanding height; is the see of a bishop, and has repeatedly been the residence of the kings of Portugal. Its principal edifices are a cathedral, two other churches, a college, diocesan seminary, three convents, and an hospital. Many of its inhabitants are employed in cutting and setting rock-crystals. The surrounding district is very fertile, and the encroachment of the sands from the coast upon it has been effectually arrested by a pine forest. Pop. 3570.

LEISNIG, a town of Saxony, in the circle of Leipzig, and 28 miles from that city, on the left bank of the Mulde. It is walled, has several public offices, a church, and an old castle with a chapel, and manufactures of woollen and linen cloth, quills, and articles in horn; spinning and other mills, dye-works, tile-works, and bleachfields. Pop. (1880), 7312.

LEISTENWEIN. See FRANCONIAN WINES.

LEITH, a seaport and parliamentary burgh in the county of Midlothian, Scotland, and 1½ mile from the centre of Edinburgh, on the south shore of the Firth of Forth, on both sides of the Water of Leith. It is connected with Edinburgh (of which it is the port) by Leith Walk and other lines of streets, and by branch lines of the railways centering in Edinburgh. The portion of the town situated on the north-west side of the river is known as North Leith, and includes the fishing village of Newhaven, that on the opposite as South Leith. The town on both sides of the river stands on nearly a perfect level. The streets and lanes in the more ancient parts, particularly in the vicinity of the harbour, are narrow and tortuous, though much improved of recent years, with the town generally. The larger and more modern portions of the town are spacious, airy, and well built. Here, also, handsome houses line two sides of what is called the 'links' or downs, a fine large open space on the south-east side of the town. The principal public buildings are the custom-house, exchange buildings, court-house, Trinity House, corn-exchange, the market, the slaughter-house, the new post-office, and the poor-house. The parish churches of North and South Leith are also both imposing edifices; the former modern, with a spire 158 feet high; the latter an old Gothic structure, dating from about the end of the fifteenth century, but largely restored in 1848. The chief educational establishments are the Leith High School, several recently erected board-schools, and two schools built from Dr. Bell's bequest; a public institute, embracing the mechanics' library and a reading-room, was opened in Tolbooth Wynd in 1867. There are a number of charitable and benevolent institutions. The Leith hospital is a large and handsome building; a Sailor's Home is in course of construction. The chief manufactures are ropes, cordage, sail-cloth, soap, candles, paints, colours, and artificial manures. There are one or two breweries, a distillery, several ship-building yards, a sugar-refinery, a large establishment for preserving meat, several extensive saw-mills, flour-mills, cooperages, iron-foundries, and engine-works. The foreign trade of the port is chiefly with the countries of Europe, particularly those on the Baltic, and the principal French and German ports, while a line of steamers now trade regularly to New York; there is also some colonial, and an important coasting trade, a number of shipping companies being engaged in trading with London, Hull, Newcastle, Aberdeen, and several other Scotch ports. The principal imports are grain, wine, tobacco, timber, hemp, wool, and tallow. The exports of coal and iron are very extensive. The number of sailing vessels on the register of the port in 1883 was 58, of 14,714 tons; steamers 133, of 70,912 tons; in 1882, 1561 sailing vessels of 237,347 tons entered, and 1488 of 225,465 tons cleared; while 2107 steamers of 751,331 tons entered, and 2062 of 731,801 tons cleared. The harbour has been greatly improved by the extension of the piers, which enables vessels to get into smooth water in eastern gales sooner than formerly, and into considerably deeper water. A west pier or breakwater advances towards the east pier, but leaves an entrance of 250 feet width. By this breakwater the harbour is sheltered from north winds. The harbour has gained considerably in depth in consequence of the improvements. There are extensive wet-docks with every modern convenience for the speedy loading and discharging of cargoes, and three public graving-docks, capable of receiving the largest vessels; and additional docks, covering about 17 acres, were opened in 1881. The lines of the North British and Caledonian Railway Companies encircle the docks, crossing the harbour by means of a new hydraulic swing-bridge.

Leith is mentioned for the first time under the name of Inverleith, in a charter of David I. granted in 1128; and in 1329 a charter of Robert I. made a grant of the port and mills of Leith to the city of Edinburgh. It early acquired a considerable trade, but suffered repeatedly by war. In 1544 an English fleet took possession of it, and it was nearly destroyed; in 1549 it was occupied by French troops sent to the assistance of Mary of Guise; and in 1560 it was besieged by a body of English, sent by Elizabeth to assist the reformers. In 1650 Cromwell repaired Leith fort, and erected a citadel with five bastions, which were demolished at the Restoration. During Cromwell's possession the inhabitants petitioned him to relieve them from the oppressions they lay under from the magistrates of Edinburgh. The petition failed, and the grievances complained of were not removed till 1832, when Leith obtained a separate and independent magistracy, and 1833, when the docks and harbour were put under commissioners, of whom Leith appoints three. Leith unites with Musselburgh and Portobello in sending a member to the House of Commons. Pop. in 1871, 44,280; in 1881, 59,485.

LEITMERITZ, a town of Bohemia, beautifully situated on a height above the right bank of the

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Elbe, here crossed by a bridge, 34 miles north-west of Prague. It is walled, has three gates, and, though old, is well built. It is the see of a bishop, and the seat of a civil and criminal court; contains a fine old cathedral, a town-house, an episcopal palace, diocesan seminary, gymnasium, two monasteries, two hospitals, and an infirmary. Much of the Bohemian glass is polished here, and there is a considerable trade in corn, fish, wine, and fruit. Pop. (1880), 10,854.

LEITRIM, a county of Ireland, bounded north by Donegal Bay and the counties of Donegal and Fermanagh, east by Fermanagh and Cavan, south by Longford, and west by Roscommon and Sligo; is about 51 miles long by 21 broad, and has an area of 392,363 acres, of which 291,200 are estimated to be arable. A considerable portion of its western boundary is formed by the Shannon, which first flows through Lough Allen, a lake situated near the centre of the county, and almost cutting it in two. The surface in the north is somewhat rugged and mountainous, but elsewhere generally flat and in part moorish. In the valleys the soil, resting generally on limestone, is fertile, but in most other districts is cold and retentive of moisture. The principal crops are oats and potatoes, which in 1883 occupied 13,626 acres and 17,382 acres respectively, out of a total under cereal and green crops, meadow and clover, of 84,016 acres. There were 83,496 cattle, 11,225 sheep, and 23,760 pigs. The minerals include iron, lead, and copper, all at one time worked, and coal, still raised to some extent on the south side of Lough Allen. Pop. in 1841, 155,297; in 1881, 90,372. Number of emigrants from May 1, 1851, to Mar. 31, 1881, 43,483.

LELAND, or LAYLONDE, JOHN, an English antiquary, born in London about the end of the reign of Henry VII. He was educated at St. Paul's School, and Christ's College, Cambridge, whence he removed to Oxford, and then to Paris, for further improvement. Returning home he took holy orders. Henry VIII. made him his chaplain and librarian, and gave him the title of royal antiquary. In 1533 he was empowered, by a commission under the great seal, to search for objects of antiquity in the archives and libraries of all cathedrals, abbeys, priories, &c.; in consequence of which he spent six years in travelling over the kingdom, visiting the remains of ancient buildings and monuments, and collecting materials for the illustration of the history and archæology of England and Wales. He retired to his house in London to arrange and methodize the stores of intelligence which he had collected, but after about two years died insane, in 1552, without having completed his undertaking. The great bulk of his collections, after passing through various hands, was placed in the Bodleian Library in an indigested state. Hearne printed a considerable part, forming the Itinerary of John Leland (nine vols. 8vo), and Lelandi Antiquarii de Rebus Britannicis Commentaria (six vols. 8vo).

LELAND, JOHN, an English Presbyterian divine, was born at Wigan in 1691. Early in life he became the pastor of a Dissenting congregation in Dublin, and in that situation he passed the rest of his life. He acquired great reputation by his works written in defence of Christianity. His first treatise, entitled a Defence of Christianity (Dublin, 1733), was a reply to Matthew Tindal's Christianity as old as the Creation; his second, The Divine Authority of the Old and New Testament asserted, was an answer to Morgan's Moral Philosopher; but the work on which his fame mainly rest is A View of the Deistical Writers that have appeared in England in the last and present century (1754–56), republished with supplements and valuable introduction, in London, in 1837.

LELY, SIR PETER, a celebrated painter, was born at Soest, in Westphalia, in 1617 or 1618. His father, a native of Holland, whose family name was Van der Taes, was a captain in the garrison of that town, but having acquired the nickname of Captain Le Lys, or Lely, from being born at the Hague, in a house the front of which was decorated with a fleur-de-lis, his son retained it as a proper name. He was first instructed by Peter Grebber at Haarlem, and, attracted by the encouragement afforded to the arts by Charles I., he went to England in 1641, and commenced portrait-painter. He finished portraits both of that monarch and of Cromwell; but it was not until the Restoration that he rose to the height of his fame and prosperity. He fell in with the voluptuous taste of the new court in his representation of the beauties who adorned it, and by the delicacy and grace of his pencil became the favourite ladies' painter. He has transmitted the features of most of the beauties of the court of Charles II., and is particularly admired for the grace of the heads and the elegance of the draperies. He was in great favour with Charles II., who knighted him. He died in 1680. The 'beauties' at Hampton Court by him are much admired. He likewise excelled in crayon painting. His historical pictures are few. At Windsor there is a Magdalen and a Sleeping Venus; there are one or two of his pictures in the Louvre, and many of his portraits adorn the mansions of the nobility of England.

LEMAN, LAKE, a name sometimes given to the Lake of Geneva. See GENEVA (LAKE OF).

LEMBERG (Polish, *Lwow*), a city, Austria, capital of the Kingdom of Galicia, in a beautiful and romantic district on the Peltew, 365 miles E.N.E. from Vienna. It was originally surrounded by walls and ditches, which have been levelled and converted into walks; and though founded in the thirteenth century, has all the appearance of a modern town from its rapid increase in recent times. Besides being the seat of the government, and the important courts and public offices necessarily connected with it, it possesses three metropolitan sees—Greek, Arminian, and Roman Catholic. The buildings most deserving of notice are the Greek metropolitan church, with the archbishop's palace, magnificent structures in the Italian style, finely situated on a height on the west side of the town; the Latin cathedral, built by Casimir the Great in 1370; the Dominican church, after the model of St. Peter's at Rome; the Protestant church; three synagogues; the town-house, with a very lofty tower; the university, possessed of a library of 48,000 volumes, and numerous collections, and attended by about 1400 students; the Ossolinsk Institute, with a library of 58,000 volumes, relating mostly to Slavonic history and literature, 1200 MSS., and 15,000 coins and medals, and numerous collections of paintings, engravings, antiquities, &c.; the theatre; the theological and philosophical institute, for the regular clergy; three gymnasia, an academy of arts, two normal colleges and numerous other schools, superior and elementary; a deaf and dumb institute, a general infirmary and lunatic asylum, blind asylum, large military hospital, an hospital of the sisters of charity, a workhouse, penitentiary, and house of correction, extensive barracks, a military swimming-school, and bathing establishment. The manufactures consist chiefly of woollen and cotton tissues; and about a mile from the town there is a very extensive tobacco factory belonging to government. But Lemberg depends far less on manufactures than on trade. This, which is very much in the hands of the Jews, who here muster to the number of more than 26,000, is very important, the trade of Galicia centering in Lem-

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berg. Much of it is merely transit, and extends over the whole year; but a considerable portion of the whole is confined to the large fairs, which take place at stated periods. One of these, called the Drei Königs Messe, lasts six weeks, and attracts vast numbers of dealers from all quarters. The quantity of business then transacted is very great. In 1656 Lemberg successfully resisted the Russians; in 1671 it was laid under contribution by the Turks; and in 1704 was stormed by the Swedes under Charles XII. Pop. (1880), 109,746.

LEMERY, NICOLAS, one of the best known of the older French chemists, was born at Rouen, Nov. 17, 1645. His father, who was 'procureur' for the parliament of Normandy, was a Protestant, and his son was brought up in the same faith. At an early age he displayed a taste for chemistry, and he was accordingly apprenticed to a relation who was an apothecary at Rouen. But he did not find his craving for chemical knowledge gratified here, and accordingly he went to Paris in 1666, and attached himself to Glaser. Lemery soon left Glaser and took up his abode at Montpellier, where he had the free use of a laboratory, and began to give lectures which excited great interest and were attended by many of the influential inhabitants of the place. He also practised as a physician, though not legally qualified. In 1672 he returned to Paris, worked for a time in Prince Condé's laboratory, and afterwards fitted up one in his own house in the Rue Galande, and gave courses of lectures on various parts of chemistry. The success of his lectures seems to have been very great. He had plenty of pupils and large audiences, and his skill as an apothecary and manufacturer was rewarded by the sale of certain preparations, especially the sub-nitrate or 'magistery' of bismuth, which was in increasing demand as a cosmetic. Lemery, however, was not, as has been asserted, the sole possessor of this treasure; the method of preparing it had been published long before Lemery's birth. The popularity of his lectures was widened and enhanced by his Cours de Chimie, which appeared at Paris in 1675. This book went through numerous editions —thirty-one, it has been calculated—and was translated into the chief European languages. The book is plainly modelled upon the prior treatises of Lefebure and Glaser (see those names), the opening chapters being identical in manner and treatment. The difference between them is that Lefebure's book is imbued with Paracelsian ideas, is the most theoretical, and is least comprehensive in treatment of facts. Glaser's is a guide to assist in the preparation of certain compounds, the processes having been all tried by the author; the theoretical part is introduced only in so far as it elucidates the reactions and changes described—it is remarkably precise and clear. Lemery's shows proof of the author having profited by the work of his predecessors. The theoretical part resembles Glaser's; the descriptive part is clear, but as the author aims at giving a review of the whole of the science, parts of it are of necessity borrowed from others who had more confused notions on particular subjects than Lemery possibly might have had, if he had been giving his own experience. The praise bestowed on this work, good though it may be admitted to be, is out of all reasonable compass, and to maintain it at an exalted level it has been found necessary unduly to depreciate prior knowledge. In 1681 the religious troubles began to harass him; he was required to demit his office by a given time, and though he gave some lectures subsequently he had ultimately, in 1683, to take shelter in England, having previously declined a request of the Elector of Brandenberg to go to Berlin as a chemist. He was well received in England by Charles II., to whom he dedicated an edition of his book, but he abode for a brief time only, and returned later in 1683 to France. He then graduated as Doctor of Medicine at Caën, went to Paris, where he soon had a very large practice; but in 1685 the revocation of the Edict of Nantes forbade him, as a Protestant, the exercise of this profession. Against the results of this he struggled for a little, but the necessities of life were too powerful for him, and in 1686 he joined the Romish Church. Notwithstanding, he still encountered opposition from mediciners and apothecaries with regard to his preparations, but this being removed he spent the remainder of his life in peace. In 1699 he became an associate of the Academy of Sciences. Besides the Course of Chemistry, already mentioned, Lemery wrote and published a number of separate works and papers. Among these may be mentioned, Pharmacopée Universelle (Paris, 1697, 4to), Traité Universelle des Drogues Simples (Paris, 1698, 4to), Traité de l'Antimoine (Paris, 1707, 12mo). He analyzed a number of mineral waters; investigated wax, manna, corrosive sublimate, camphor, &c.; and it also deserves to be remembered that he was one of the first to attempt the elucidation of natural terrestrial phenomena by referring them to chemical action, and to exhibit these on an experimental scale, as when he made what is still known as Lemery's volcano, by placing a mixture of sulphur and iron in a hollow, heaping up the earth over the mixture, moistening, and leaving it to itself. By-and-by combination between the iron and sulphur begins, heat is evolved, the earth heaves and swells, steam escapes, and the resemblance of the miniature eruption to the larger original is very striking. Lemery died of apoplexy at Paris, June 19, 1715, leaving two sons, both of whom were afterwards distinguished as chemists.

LEMMA, in mathematics, denotes a preliminary proposition, laid down in order to clear the way for some following demonstration, and prefixed either to theorems, in order to render their demonstration less perplexed and intricate, or to problems, to make their solution more easy and short.

LEMMING (*Myodes*). These little quadrupeds belong to the order of Rodentia or 'gnawing' mammalia, and are included in the family of the rats and mice (Muridæ). The lemmings agree in possessing most of the characters of the family, the chief among which are the possession of a long tail, destitute of bushy hairs; the presence of complete clavicles or 'collar-bones;' the hind-feet possessing five toes, and the fore-feet four toes and a rudimentary thumb. The tail of the lemming is, however, shorter than the body, and the fore-feet are provided with nails of considerable size, adapting these members for burrowing. Two species are familiar to zoologists. These are the common or European Lemming (*Myodes lemmus*) and the Canadian species (*M. Hudsonius*). The former inhabits Norway, Sweden, Lapland, and the north of Europe generally. It is of the size of the common rat; the body-colour being brownish, variegated with black; the sides of the head and belly being white, or of a grayish tint. The legs and tail are of a gray colour. The head is large and shortened, the body thick-set, and the limbs stout. They feed on plants, and are exceedingly destructive to vegetables and crops in whatever regions they are found. They burrow under the ground at a limited depth, and in winter appear to make journeys of considerable length under the snow in search of food. By far the most extraordinary feature in the history of these forms is the migratory instinct, which prompts them to make long journeys in the autumn, or on the approach of winter, guided or incited probably by the search for food. At these migratory periods, which

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appear to occur at irregular intervals, the lemmings assemble in immense hordes, and in the course of their southward journey they exhibit the peculiar feature of marching in a straight, unbroken line, thus pursuing an undeviating course. If in the course of this determined march they come to a river or expanse of water, they swim straight across, no matter its rapidity or breadth, and then resume their journey on the opposite side with the same strong, undeviating purpose and will. The march is proceeded with for the most part during the night, and in their journey they completely devastate the herbage of the district through which they pass. They never appear to enter dwellings or to venture nearer man than necessity compels them; and although very large numbers set out on the migratory tour, very few return to their former haunts; accident, disease, and the attacks of beasts and birds of prey thinning out the ranks of the strange procession; the forward march never ceasing till they reach the sea, which they enter and swim out in the same direction till they perish in the waves. When irritated or alarmed, the lemmings raise themselves on their hind-feet and utter a strange barking sound. The migratory cavalcade occasionally undergoes a division into two parties or factions, the one of which may attack the other. They breed several times annually, and produce from five to six young at a birth. The superstitious inhabitants of Norway and Sweden believe that these animals descend from the clouds, so great are the numbers which may suddenly appear in a district; and tales are gravely told of their falling into the laps of women sitting at cottage doors, or of their dropping on the decks of ships when far out at sea. (Pl. CLXXII.–CLXXIII. fig. 16.)

The lemming is not employed, through its flesh or fur, in a commercial sense. The Canadian or Hudson's Bay Lemming is of an ash-colour, having the back striped of a tawny colour, and a lighter line along each side. The hair is much softer and longer than the European species. The migration of the Canadian Lemming has not been thoroughly determined; although it appears probable that, like its European neighbour, it makes journeys from place to place at irregular periods. Excrement similar in appearance to that of these lemmings was seen extending in long ridges for above 2 miles, and this in a district which none of these animals inhabited (Lyon). Altogether, the habits of the Canadian species would appear to be less marked than those of the common lemming. The Canadian form occurs in Labrador and on the coasts of North America which border on the Polar Sea. Sir J. Richardson says that this species only occurs in the neighbourhood of the sea. It is said to be inoffensive in habits, and to be readily domesticated in a short space of time.

LEMNOS (now *Stalimene*), the most northerly island of the Grecian Archipelago, between the Hellespont and Mount Athos. It has an area of 147 square miles, and abounds in vines, wheat, &c. The principal town on the island is Limno, or Kastro (the ancient *Myrina*), the see of a Greek bishop. It is on the western side, has a citadel, harbour, and ship-building docks, and is the seat of all the commerce carried on with the island. Pop. 5000. Lemnos formerly contained a volcano, Mosychlus, which was regarded as the workshop of Hephaistos (Vulcan). Mythology assigns this island as the residence of Hephaistos (whence he is called *Lemnius*) after Zeus had hurled him from Olympus. Among its curiosities are a labyrinth and the Lemnian earth, which was formerly supposed to cure festering wounds and the bite of venomous serpents. Pop. 22,000.

LEMOINE, Francis, an historical painter, born at Paris in 1688, was placed, in his thirteenth year, with the painter Galloche, with whom he remained twelve years, during which time he paid particular attention to the works of Carlo Maratti and Pietro di Cortona. In 1718 he became member of the Academy. The war of the Spanish Succession preventing the support of young artists at Rome by the French government, he was obliged to defer the accomplishment of his wish to visit Italy till a rich amateur, of the name of Bergier, took him for his companion, in 1723. He finished one of his best paintings, a Female entering the Bath, during his residence in Bologna, Venice, and Rome. On his return he was appointed professor at the Academy, and soon found an opportunity of displaying his talents in painting the chapel of the Holy Virgin in the church of St. Sulpice, the subject of which is the Ascension. Lemoine subsequently painted the ceiling in the Hall of Hercules at Versailles, a painting 64 feet long and 54 broad, undivided by any architectural interruptions. It contains 142 figures. He had almost finished the work, when he observed that the main group was placed a little too low, and he did not hesitate to raise it, although alterations were thus rendered necessary in almost all the other figures. His exertions in this work, which cost him the labour of seven years, weakened his health. His domestic misfortunes augmented the natural gloom of his disposition, and his chagrin at the marks of favour conferred on inferior artists combined with these circumstances to unsettle his reason. In a fit of insanity he put an end to his life in 1737. On an unprejudiced estimate of his labours, it cannot be denied that the decline of the French school is in some measure owing to him. His drawing is incorrect, his forms are disfigured by mannerism, but his colouring is brilliant, though wanting in truth, and his grouping is skilful.

LEMON. The lemon-tree (*Citrus limonum*) was originally brought from the tropical parts of Asia, but is now cultivated very extensively in the south of Europe, especially in Sicily, and the fruit forms an important article of commerce. It is congeneric with the orange and citron, and belongs to the natural order Aurantiaceæ. Its stature is that of a large shrub or small tree; the leaves are oval, pointed, twice as long as broad, and, like those of the other species, contain scattered glands which are filled with a volatile oil. The beauty of its smooth, evergreen foliage, and the delightful fragrance of the flowers and fruit, have made it a great favourite in all our greenhouses. The shape of the fruit is oblong, but its internal structure does not differ from that of the orange. The juice is acid and agreeable; mixed with water and sugar it forms the well-known refreshing drink called lemonade, which is in general use throughout all parts of the civilized world. Lemon juice is also employed by calico-printers to discharge colours. See Citron.

LEMON, Products of. The chief products of the lemon are the juice and the oil. The juice is expressed from the ripe fruit; it has a specific gravity of 1·04, and contains about 1·5 per cent. of citric acid (which see), as a source of which it is much used. It also contains sugar, albuminous and vegetable matters, and there is also present some mineral matter, nearly half of which consists of potash, the rest being silica, chlorine, sulphuric and phosphoric acids, iron, lime, magnesia, and soda. Lemon juice is apt to decompose; this can be prevented to some extent by excluding air; by heating the juice to 150°, filtering, and keeping in full bottles; or by addition of a little alcohol. The juice is used in fevers as a refrigerant. The volatile oil of lemon is got from the fresh rind either by pressure or by distillation with water. It is of a

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yellow or greenish colour, has a specific gravity of 0·85, a characteristic smell and taste, and dextrorotation. It dissolves in ether, oils, and absolute alcohol, but sparingly in water. It consists mainly of a compound isomeric with oil of turpentine, called *citrene;* but if it has been subjected to the action of the air there is usually present an oxidation constituent called lemon-camphor, which frequently deposits spontaneously, or can be separated by distillation. The camphor is a crystalline, colourless body with a lemon-like smell and pungent taste, and it is soluble in boiling water. Lemon-oil is acted on more or less by the ordinary strong chemical reagents, but it has a special affinity for hydrochloric acid, of which gas it can absorb very many times its own volume, yielding compounds with one and with two molecules of the acid respectively. The monohydrochlorate seems to exist both in a liquid and in a solid form, and the same is the case with the dihydrochlorate. The solid dihydrochlorate forms crystals which are colourless, with an aromatic odour; it is insoluble in water, but dissolves in alcohol and in oils. The liquid dihydrochlorate is an oil, colourless, and insoluble in water. Lemon-oil is used in medicine and in perfumery. In medicine it is used as a stimulant and rubefacient; it also forms part of syrup of lemon and tincture of lemon. It is sometimes adulterated with turpentine and cheaper oils; these can usually be detected by the odour, or by the alteration in the optical properties of the oil. What is commonly called *salt of lemons* is in reality the same as salt of sorrel, being either the quadroxalate of potassium or a mixture of oxalate of potassium and cream of tartar. It is therefore highly poisonous.

LEMON, Mark, an English humorist and dramatic writer, was born in London on the 30th Nov. 1809. He early adopted the literary profession, and made his first essays in the lighter drama. In this field he was pretty successful, and the modern London stage was supplied by his facile pen with more than sixty pieces, farces, melodramas, and comedies, among which we may mention The School for Tigers, The Serious Family, and The Ladies' Club. On the establishment of Punch in 1841 he became joint-editor with Henry Mayhew, and two years later, sole editor. He was also the literary editor of, and an extensive contributor to, the Illustrated London News, and an occasional writer to Dickens' Household Words, Once-a-Week, and other periodicals. Among his later productions are some novels of average merit: Loved at Last, Golden Fetters, Wait for the End, &c. Fully occupied as his time must to all appearance have been, he yet found enough to edit a Jest Book, to deliver at the Gallery of Illustration a course of lectures, About London, and to give a series of representations of Falstaff, both in the metropolis and the provinces. He died at Crawley, Sussex, on the 23d May, 1870.

LEMONADE, a drink made of water, sugar, and the juice of lemons. A good recipe for its manufacture is: two sliced lemons, 2½ oz. of sugar, boiling water, 1½ pint; mix, cover up the vessel, let it stand, with occasional stirring, till cold, then pour off the clear liquid through a piece of muslin or hair sieve. Prepared in this simple way it is a very grateful beverage in warm weather or to feverish patients. The taste is more agreeable if the sugar is rubbed with the peel of the lemon, so as to imbibe the oil contained therein; but the lemonade is thus rendered stimulant rather than cooling, and many persons suffer from headache in consequence. Aerated bottled lemonade as made by the best makers is prepared by putting 1½ fluid oz. of lemon syrup into each bottle, which is then filled up with aerated water at a bottling machine.

LEMPRIERE, John, D.D., a native of Jersey, graduated at Oxford as A.M. in 1792. In the same year he became head-master of Abingdon grammar-school, and afterwards master of the free grammar-school at Exeter. In 1811 he was presented to the rectory of Meeth, Devonshire, which living, together with that of Newton Petrock, in the same county, he held till his death. His Classical Dictionary, published in 1792, and of which many editions and abridgments have appeared, was in its day the only English book of reference on ancient geography, biography, and mythology. It has been superseded as an authority by Dr. Smith's dictionaries. He also wrote some other works, among which was a Universal Biography, published in 1808. He died of apoplexy, Feb. 1, 1824.

LEMUR, a genus of the Quadrumana or Monkeys, forming the type of the family Lemuridæ, and including a number of very distinct sub-genera. The zoological position of the lemurs has been much debated, and so wide are the differences between the higher apes and the lemurs, that M. Gratiolet expressed himself in favour of including the lemurs among the Insectivorous Mammals, such as the mole, shrew, &c., to which, in their general structure, they show several points of intimacy. The question as to their proper position is the more difficult also, from the discussion excited as to the proper place in the mammalian class of the so-called 'Flying Lemurs' or Galeopithecidæ. These latter are curious lemurine forms, inhabiting the Indian Archipelago, and distinguished by the presence of a *patagium* or flying membrane, analogous to that found in the flying-squirrels and flying-phalangers. The flying-lemurs were at first included in the family Lemuridæ among the Quadrumana, and by some authorities are still classified in this manner. But the newer, and apparently more natural arrangement, is to regard the flying-lemurs as a connecting link between the Insectivora and lower Quadrumana, and as such to classify them as an aberrant section of the former group. We shall here follow the simplest classification, and shall regard the lemurs as included in the order Quadrumana—the order Bimana, to which man belongs, being recognized as entirely a distinct and separate group. In this arrangement the lemurs form examples of the lowest section of the Quadrumana or Monkeys. They are thus classified with the Strepsirhina (Prosimiæ) or lower Quadrumana, which are distinguished by the twisted or curved nostrils, situated at the extremity of the snout; by the claw-like nail of the second digit or finger of the hind limb; by the presence of five toes on all the limbs; by the generally opposable nature of the great toes of both fore and hind feet, so as to constitute the feet hand-like organs. The Lemuridæ or True Lemurs are specially distinguished by the habitually four-footed or quadrupedal mode of progression. The tail is elongated and furry, but is never prehensile. The muzzle is elongated, giving these forms the general appearance of a fox or cat; and from this resemblance the familiar names of 'Fox-headed Monkeys,' or 'Madagascar Cats,' have been applied to the lemurs. The skin is covered by a furry coat. The hind limbs are longer than the fore limbs; the second toe in the hind foot being long and claw-like, and the nails of all the other toes being flat. The fourth digit of the hand, and specially of the foot, is longer than the others. There are no cheek-pouches or horny tubercles on the nates (callosities). The thumb can always be opposed to the other fingers, and has a broad, flattened nail. The ears are small, and the eyes large. The incisor teeth are generally four, the canines two, and the molars twelve in each jaw. The True Lemurs are almost exclusively con-

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fined to Madagascar, in which island they take the place of the other varieties and kinds of apes found on the African continent and elsewhere. They are all of a gentle and playful disposition, and are very readily tamed. They are arboreal in their habits, and appear to subsist chiefly upon a vegetable diet, but they also eat insects, and even prey upon the smaller birds and their eggs. The Indris (*Indris brevicaudatus*) is the largest species. It is about 3 feet high, possesses long hind-limbs, and a rudimentary tail. This species is tamed by the inhabitants of Madagascar, and trained to hunt like dogs. The Ring-tailed Lemur (*Lemur catta*) is an elegant form, of gray colour, with the bushy tail adorned with rings of black and white. The genus *Tarsius* has four upper and two lower incisor teeth, and a tufted tail. The canine teeth are large, and the nose pointed. The tarsus or ankle is elongated, and from this feature the name of the genus is derived. The *Tarsius* is also remarkable from the fact that of all animals, and specially of all mammals, it alone resembles man in having its teeth arranged in a continuous series, and without any interval or *diastema* between them. These latter forms inhabit Southern and Eastern Africa, and Eastern Asia. The genus *Otolicnus* is so named from the large size of the ears, which can be folded down or erected, like those of bats. The Nycticebidæ or Loris—sometimes also called 'Slow Lemurs,' from their slow and graceful movements—possess a rudimentary or abortive tail. The ears are small and rounded; and the eyes are very large, and situated close together on the front of the head. They feed on small birds and insects, and are chiefly nocturnal in habits. They inhabit India, Ceylon, and the Eastern Archipelago. The Slender Loris (*Loris gracilis*), found in Ceylon, and the Sloth Monkey (*Nycticebus tardigradus*) of the Eastern Archipelago, may be cited as representative forms. The Galeopithecidæ or Flying Lemurs are represented by a single genus including a few species. The flying-membrane or *patagium*, from which their peculiar characteristics are derived, connects the fore and hind limbs together, extending along the sides of the body and of the neck, and also joins the hind limbs and tail. The membrane also unites the digits of the foot, and is hairy on both sides. The fore limbs are longer and more powerful than the hind limbs. Neither the great toes nor thumbs can be opposed to the other digits; and the toes number five on each foot. The dentition is peculiar. There are four incisors in the upper and six in the lower jaw; two canines and ten molars in each jaw. The crowns of the six lower incisors are broad, and divided into numerous teeth, so as to exhibit a *pectinate* or comb-like arrangement. These forms are arboreal in their habits, and make short flying leaps from tree to tree, the membrane acting like a parachute in supporting them during their flight or leap through the air. They are fruit-eaters, but also prey upon insects and birds. They are nocturnal in habits; and when at rest suspend themselves from trees by the limbs, the body and head being pendent. The mammary glands are four in number, and are placed on the breast. All other Quadrumana possess only two mammæ. The most familiar species is the *Galeopithecus volitans* of Java and the neighbouring islands. It measures about 20 inches in length. The Flying Lemurs possess intimate relationships with the Insectivora, as argued by Peters; and, as already remarked, many modern naturalists regard them as an aberrant genus of this order. (See Pl. XXXVIII.–XXXIX. figs. 1–6.)

LEMURES (*manes*, *lamiæ*, ghosts, spectres), among the ancient Romans, the souls of the dead which tormented men in the night, whence they were called *nocturnal* or *black*. According to some writers lemures was the common name of all spirits of the dead: the good were called *lares*, the bad *larvæ;* but the lemures were generally identified with the larvæ. In order to lay them, a ceremony called *lemuria*, *lemuralia*, *remuria* was observed on the nights of the 9th, 11th, and 13th May. The head of the family rose at midnight, and went outside the door, making signs with his hand to protect him from the spectres. He then washed his hands thrice in spring water, and having turned round took some black beans in his mouth, which he threw over his head at intervals, repeating nine times a form of words, intimating that he gave the beans to redeem himself and his family from the spirits. He then washed his hands again, and called out nine times to the spectres to begone. After this he was at liberty to look round. The days of these ceremonies were unlucky, and the temples were closed.

LENA, a river of Siberia, one of the largest in the world. It rises on the north-western side of the mountains which skirt the western shore of Lake Baikal, about 70 miles E.N.E. of Irkutsk. It flows in a winding course, N.N.E. and north-west, receiving the Vitim, the Aldan, the Vilioui, and other tributaries. Then a mighty stream it flows generally north, till, separating into branches, it forms a great number of islands, and discharges itself into the Arctic Ocean by several mouths, in lat. 73° N., and lon. about 128° E., having thus passed over 21° of lat. and 22° of lon. Its direct course, making no allowance for windings, is about 1480 miles, and its actual course, windings included, about 2770 miles. Its basin is exceeded in the Old World only by those of the Obi and Yenissei, and in the New World only by those of the Amazon, Mississippi, and La Plata.

LENAU. See NIEMBSCH VON LENAU.

LENCLOS, ANNE, better known as *Ninon de Lenclos*, was born at Paris, according to some authorities, in 1615, according to others in 1616. Jal, who sought the registers of sixty-eight parishes of Paris for her birth, found that she was baptized at St. Jean en Grève, on 10th November, 1620. Her father is described as Henri de Lanclos escuier de Monseigneur de St. Luc. Voltaire and some of her biographers say that her father was a poor player on the lute, and even a procurer to houses of ill-fame, others that he was a poor gentleman; but it seems to have been by his influence, in opposition to that of her mother, who is represented as trying to bring her up as a *dévote*, that Ninon entered on her peculiar mode of life. She was early left an orphan, but had received a good literary education, and had formed her taste by reading the works of Montaigne and Charron. Even at an early age she was distinguished for her wit and acuteness. She played the harpsichord and several other instruments in a masterly style, sang with taste, and danced with grace. With such attractions she had no want of lovers and suitors; but her love of independence prevented her from forming a serious connection. To render herself entirely free she invested her property in an annuity, on which she lived frugally, but in good style. Without making a traffic of her charms she attached herself to those who pleased her as long as her inclination continued. Inconstant in love, but true in friendship, equable in her temper, charming in her conversation, capable of forming young men, but also of seducing them, sensible without making a display of her powers, handsome even in old age, she wanted nothing but female virtue, yet she conducted herself with dignity. She rarely accepted presents in return for her favours, though she gave herself up, from blind sensuality, to transient passion, without concerning herself whether its object was worthy of her. Having extended her favours in succession to the most celebrated men of her time,

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she proved to all that mere sensual desire, and not vanity, was the cause of her passion. Notwithstanding her reputation for gallantry the most amiable and respectable ladies of the time, such as La Fayette, La Sablière, and Maintenon, cultivated her friendship. Of Madame de Maintenon she used to say, that she wished to employ her to drive away the tedium of rank and age at Versailles. Even in her old age her house was the rendezvous of the most agreeable personages of the city and court, and of the most distinguished men. Scarron consulted her on his romances, St. Evremond on his poems, Molière on his comedies, Fontenelle on his dialogues, and La Rochefoucault on his maxims. Richelieu is said to have been her first lover, and Coligny, Condé, Sévigné, &c., were her lovers and friends. She retained the charms of her manners and conversation, and to some extent of her person, to extreme old age. When Christina, queen of Sweden, was in Paris she paid Ninon a visit. She bequeathed to Voltaire, who was introduced to her shortly before her death, 2000 francs to purchase books. She died, according to one set of authorities, on 17th October, 1706; according to another, 17th October, 1705. One of Ninon's sons, named La Boissière, died in 1732 at Toulon, an officer in the navy. Ninon's eldest son died a tragic death. He had fallen in love with his own mother, without knowing his relationship to her. She was obliged to reveal the secret to him to escape his importunities, and he killed himself from despair. This terrible event has been introduced by Le Sage into his Gil Blas. The Lettres de N. de Lenclos au Marquis de Sévigné are the work of Damours, the author of the life prefixed to the collection. The Correspondance secrète de, &c., edited by Ségur (1789), is also a supposititious work.

LENGTH, MEASUREMENT OF. One yard is the standard English unit of length; it is the distance between two points on a certain metal bar kept in the exchequer chambers. One foot, the third part of a yard, is another well-known unit of measurement. Ordinary English units are connected with one another in an inconvenient manner; thus the length of a line may be stated in feet or in inches, or in feet and inches. Physicists use the decimal system, and instead of saying 3 yards 1 foot 6 inches, say 10·5 feet. In advanced physics the centimetre, which corresponds to 0·032809 feet, is of much importance; it is called the *C* unit of length; it is connected with other units of length by the decimal system as follows:—

One millimetre (a thousandth of a metre)	=	0·003281 feet.
One centimetre (a hundredth of a metre), the *C* unit	=	0·032809 ,,
One decimetre (a tenth of a metre)	=	0·328090 ,,
One metre	=	3·280899 ,,
One decametre (ten metres)	=	32·808992 ,,
One hectometre (one hundred metres)	=	328·089917 ,,
One kilometre (one thousand metres)	=	3280·899170 ,,

(See METRE.) The mean distance from the earth to the sun is the astronomical unit of length, the absolute determination of which is of great importance. When the length of the base of a triangle is known, and also the angles at the base, the lengths of the other sides may be calculated by trigonometry. A line in Ulster was measured with great care; this enabled surveyors, by a system of triangulation, to determine absolute distances in the British Islands, and to measure the length of a degree of latitude. A few such measurements in different parts of the world gave the approximate shape and size of the earth. Observing the altitude of the moon at midnight at two places whose latitudes were very different, enabled astronomers to determine the moon's parallax, and its distance from the earth. The parallax of Venus when in superior conjunction with the sun is very small, and when in inferior conjunction the planet is invisible unless it crosses the sun's disc. The parallax of Mars when in opposition has enabled his distance from the earth to be calculated; the relative distances of the planets from the sun are known, and the distance of the earth from the sun as calculated is 91,000,000 miles. Observations of the transit of Venus of 1874 have contributed to a more accurate determination. The distances of the fixed stars are too great to be measured approximately, even when the orbit of the earth is used as a base line; Bessel's method of measurement is described in treatises on astronomy. Surveyors measure horizontal distances by means of a chain 66 feet long, and vertical heights by means of a level and levelling staff. Verniers and micrometer screws are attached to theodolites, cathetometers, microscopes, &c., for the measurement of angles and distances.

LENNEP, a town of Prussia, province of Rheinland, 21 miles E.S.E. of Düsseldorf, with cotton and woollen manufactures. Pop. (1880), 8077.

LENNOXTOWN, a town of Scotland, county of Stirling, 9 miles north of Glasgow, on a branch of the North British Railway, the inhabitants of which are employed in the collieries, print-works, bleachfields, alum-works, and other industrial establishments of the vicinity. Pop. (1881), 3249.

LENÔTRE, ANDRÉ, a French architect and ornamental gardener. He was born at Paris in 1613, and was the son of the superintendent of the gardens of the Tuileries, who, wishing to make him an artist, placed him as a pupil with Vouet the painter. He showed a strong taste for design, particularly in laying out gardens and arranging their scenery. He first displayed his talents at the Château de Vaux; but his plans for the decoration of the park of Versailles contributed principally to establish his reputation. He afterwards embellished the gardens of Clugny, Chantilly, St. Cloud, Sceaux, the Tuileries, &c. Louis XIV. richly rewarded the labours of Lenôtre, and in 1675 bestowed on him letters of nobility, and the cross of the order of St. Michael. He took a journey to Italy in 1678, and at Rome he was honourably received by Pope Innocent XI. He died at Paris in 1700. Delille has celebrated the talents of Lenôtre, whose style of ornamental planting was fashionable not only in France but in Britain, till it was superseded by the designs of Kent, Brown, and the modern landscape-gardeners.

LENS, a portion of a refractive medium (generally glass) bounded by smooth regular surfaces. These surfaces are usually spherical, the line joining the centres of the spheres passing through the middle of the lens. Fig. 2, in the plates to OPTICS, shows sections of six lenses. *c*, *e*, and *g* are convex lenses; they are thickest at the centre; they cause solar light to come to a focus: *c* is *double-convex*, *e plano-convex*, *g concavo-convex*: *d*, *f*, and *h* are concave lenses; they are thinnest at the centre; they cause parallel solar rays to become divergent: *d* is *double-concave*, *f plano-concave*, *h convexo-concave*. As red and blue rays of light are refracted at different angles, the foci for these rays, coming from the same object, are different, so that images of white objects seen through lenses are usually slightly coloured. A compound lens formed of lenses of crown and flint glass may be made *achromatic*. (See OPTICS.)

LENT (old English). *Lent* is the English name for the quadragesimal fast in spring, which in Italian is called *quaresima;* in French, *carême*, from the Latin *quadragesima*. In the article FASTS the subject of fasting in general, and the fasts and days of abstinence observed by the Roman Church, have

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been treated of. Lent is a fast intended to prepare Christians for the Easter festival. Protestants generally consider Lent not to have been established before the second or third century; but the Catholic Church maintains, with St. Jerome, St. Leo, St. Augustine, and the majority of the fathers of the church of the fourth and fifth centuries, that it is of apostolic origin. They reason thus: that which we find universally established in the church, and of which we cannot, nevertheless, find the institution by a council, must have been established by the apostles; and the sixty-ninth apostolical canon, the Council of Nice in 325, that of Laodicea in 365, and the fathers of the second and third centuries, speak of Lent as a usage generally observed by the church. In the Latin Church Lent formerly lasted but thirty-six days; in the fifth century four days were added, in imitation of the forty days' fast of the Saviour, and this usage became general in the Western Church. The Greeks begin Lent one week sooner than the Roman Catholics, but they do not fast on Sundays, except in Passion-week, though their fasts, generally speaking, are much more strict than those of the Roman Catholics. The Latin monks had formerly three fasts of forty days each, and the Greeks observed four besides Lent; but they have reduced them to seven days each. Some oriental sects had still other great fasts. The eighth Council of Toledo, in 653, orders that those who break the fast without necessity shall eat no meat during the whole year, and shall not partake of the Lord's supper at Easter. The bishop must give the sick and aged permission to eat animal food during Lent. Such permissions are, however, generally put into the hands of physicians, from whom it is not difficult to obtain them. Until the year 1200 but one meal a day was eaten during Lent. According to the direction of the church alms should accompany fasting in Lent. A Catholic writer says if this direction were generally complied with the poor would live better in Lent than at any other season in the year. It cannot indeed be said that almsgiving is more neglected than fasting, as by the bulk of the faithful both are impartially ignored. There is reason, however, to believe that Lent was much better observed in the early ages of the church and the middle ages than it is now, and its beneficial effect on health has been attested by physicians. The Reformation gave a fatal blow to this as to other ceremonies of the church. The close of Lent is celebrated in Catholic countries with great rejoicings. In Rome the *pizzicaruoli*, or shops in which hams, sausages, eggs, &c., are sold, are illuminated and ornamented in the most picturesque manner the night before, in order to attract buyers. The statue of a saint made of butter is often seen. Heaps of eggs are multiplied endlessly by reflecting mirrors, and the whole scene is quite brilliant and attractive. Milk is allowed during Lent. The English Church has retained Lent and many other fasts, but gives no directions respecting abstinence from food. See CARNIVAL.

LENTIL (*Ervum lens*), a leguminous plant belonging to the same genus as the hairy tares of the farmers, and similar in appearance to the vetches. The common lentil comes from France and the Valais. The thin annual root brings forth weak, creeping, hairy, angular stalks, from 1 to 2 feet long, divided from near the bottom into several branches, and clinging for support to other plants. The pinnate leaves stand alternately; from the axils of the leaves proceed fine stalks, which each have two or three whitish flowers hanging down. The pods do not contain more than two sound seeds, flat upon both sides. Lentils are cultivated for the seeds just mentioned. They require a rather sandy yet strong soil; they are sown somewhat later than pease and vetches, because they cannot endure night frosts; they are to be sowed in drills, and well harrowed. Two varieties are cultivated—the large *garden lentil* and the common *field lentil*. The former is distinguished by its size and the greater quantity of mealy substance which it will afford. The straw of lentils is good food for cattle and sheep, particularly for calves and lambs. Lentils are often mixed with vetches, and sowed as food, both green and dried, for milch kine. As food for man they are very nutritious, and in Egypt, Syria, &c., are a chief article of diet. They are also used in soups, &c., in this country, but not to a great extent.

LENTO (Italian, *slow*), a term used in music.

LENTULUS, the name of one of the most aristocratic families of Rome of the Cornelian gens. Several individuals of this family distinguished themselves by their virtues and services; others were conspicuous in other ways. Publius Lentulus Sura, an accomplice of Catiline, was strangled in prison. Lentulus Spinther, one of the most luxurious and ostentatious men of his age, was a partisan of Pompey. He was pardoned by Cæsar. He joined Brutus and Cassius when they took the field after the assassination of Cæsar. Cneius Lentulus had the command of the legions in Upper Germany during the reign of Tiberius. He was put to death by Caligula.

LENZ'S LAW. See INDUCED CURRENT.

LEO I. (THE GREAT, ST.) was born, according to some writers, in Rome, and according to others in Tuscany. The Popes Celestine I. and Sixtus III. employed him in important ecclesiastical affairs while he was only deacon. On the death of Sixtus III. in 440 Leo was elevated to the Papal chair. The Romans were gratified with this choice, but the beginning of his pontificate was marked by an intolerant and impolitic act. He caused processes to be instituted against the Manicheans who were concealed in Rome, and gave up those who persisted in their heresy to the secular arm. In the same manner he proceeded against the Pelagians, Priscillianists, and Eutycheans, whom he exterminated. Leo approved of the acts of the council of Chalcedon (451), to which he sent his legates, except that which gave the see of Constantinople equal authority with that of Rome. Attila in the meantime laid waste the Western Empire, and threatened Rome (452). The Emperor Valentinian employed Leo to intercede with that formidable warrior in order to obtain peace. Leo addressed the barbarian with mildness, and at the same time with impressiveness; and Attila, induced probably, however, by other motives, left Italy, and retired beyond the Danube; but in the year 455 the Vandal Genseric took Rome, which was exposed to pillage for fourteen days. All the favour that Leo could obtain from him was to forbid the murder of the citizens, the burning of the city, and the plunder of the three principal churches in Rome, which contained the rich offerings of Constantine. Leo is said to have replaced open by secret confession, and extended celibacy to sub-deacons. Leo is the first pope whose writings have been preserved. These writings consist of ninety-six sermons, 141 letters, and some other works. A work On the Calling of the Gentiles, and the Epistle to Demetriades, have also been ascribed to him. His style is finished and rhetorical, and his periods have a measured rhythm which is not unpleasant. There have been several editions of his works—one by Quesnel at Paris (1675, two vols. 4to); another at Lyons (1700, folio); a third at Rome by Cacciari (three vols. folio, 1753-55); and a fourth at Venice (1757). Father Maimbourg has written his life.

LEO III. was elected pope on the death of Adrian I. in 795. He was seized in 799 by his rival Paschal,

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and imprisoned in a convent. He escaped, and took refuge in France, where he was received by Charlemagne, who re-established him on his throne, and received from him in 800 the imperial crown. Leo died in 816, honoured for his charity and the purity of his manners. He left thirteen letters, which are found in the Collections of the Councils. A book of magic called the Enchiridion has been erroneously attributed to him, and printed under his name.

LEO X. (GIOVANNI DE' MEDICI), second son of Lorenzo the Magnificent, born at Florence 11th December, 1475, received the tonsure in his seventh year, and was loaded with benefices. The election of Innocent VIII. to the Papal chair favoured the ambitious views of his father, and in 1488 Giovanni, then only thirteen years old, was made a cardinal. Lorenzo intrusted his education to the Greek Chalcondylas and the learned Angelo Poliziano. Giovanni, naturally grave, took a greater interest in the writings of the ancient philosophers than in those of the fathers of the church; it was therefore made a condition of his nomination that before he should be invested with the purple he should study theology three years at Pisa. In 1492 Giovanni took his seat as a member of the Holy College at Rome. His father died soon after, and was succeeded by his son Pietro at Florence. As the young cardinal had opposed the election of Alexander VI. to the Papal see, he exchanged Rome for Florence, where he lived in high estimation until the banishment of his family forced him to flee to Bologna (1494). In 1499 he went to Venice, Germany, and France, remained some time in Genoa, and then returned to Rome, where he lived in the enjoyment of a select society, and devoted to the arts, particularly music and literature. In 1505 he first took part in public affairs. Pope Julius II. made him governor of Perugia, and in 1511 placed him, with the title of Legate of Bologna, at the head of his forces in the holy league against France. As his suggestions, however, were little regarded by the Spanish generals of the allied armies, his influence was limited to preserving order in his camp. He was made prisoner by the French at the battle of Ravenna in 1512, but soon after regained his freedom on the dispersion of the victorious army, and returned to Bologna, where he conducted the government as legate, and after contributing to the re-establishment of the Medici, remained at Florence until the death of Julius II. recalled him to Rome. Although only a deacon, he was chosen to succeed Julius on the 11th March, 1513; the 19th he was ordained priest and bishop, and ascended the Papal chair in the thirty-eighth year of his age under the name of Leo X. He immediately appointed two of the principal writers of his time, Bembo and Sadolet, his secretaries. In foreign politics he followed the system of his predecessors, opposing the domination of foreigners in Italy as much as possible. He made a favourable peace with Louis XII., who was compelled by the disasters which the French arms had experienced to abandon Italy. Public tranquillity being thus restored in the first year of his government, he gave all his attention to the promotion of literature and the arts, which had been neglected by his predecessors. The university at Rome was restored and endowed, privileges were granted it, and the most distinguished men selected as instructors. He also established a particular society for the publication of Greek authors under the supervision of John Lascaris. That scholar, whom he had invited from Venice, and Marcus Musurus brought over a number of young linguists, whose influence assisted in promoting a taste for classical literature. He requested the possessors of ancient manuscripts in all countries to make them known to him, and the publication of the five first books of the Annals of Tacitus was one of the finest fruits of his efforts. Several private individuals followed the example of the pope; among whom Chigi, a merchant, was distinguished, who established a collection of works of art, and published an edition of Pindar and Theocritus. To prevent a union of Spain, France, and Austria, Leo favoured a reconciliation between the Kings of England and France, and even pretended to favour Louis' plans on Milan. His design of obtaining the Kingdom of Naples for one branch of his family, and the Duchies of Ferrara and Urbino for other branches, made the friendship of this monarch necessary, and produced a secret alliance between them; but when a French army appeared on the frontiers he was not satisfied with increasing his power by a purchase of Modena from the Emperor Maximilian, but also sent Bembo to Venice to detach the republic from the French alliance, in which, however, he did not succeed. This artful varying policy was at that time universal, and Leo cannot be held specially responsible for it. After the death of Louis XII., Francis I. having ascended the throne, and war appearing unavoidable, Leo joined the alliance of the emperor, the King of Arragon, the states of Florence, Milan, and Switzerland; but after the battle of Marignano he withdrew, and in 1515 he had an interview with Francis at Bologna, and formed with him a concordat advantageous to both, but warmly censured by the French nation. In order to increase the power and splendour of his family, after the death of his brother Giuliano he deposed the Duke of Urbino in 1516, and gave the duchy to his nephew Lorenzo. Leo saw with regret the reconciliation of the belligerent powers, which was effected in the same year. In 1517 the Duke of Urbino, who had been deprived of his estates, recovered them by force of arms. Leo, however, collected a powerful army against him, and forced him to renounce his claims on honourable terms. In the same year a conspiracy against the pope was discovered, and Cardinal Petrucci, who was suspected of being the principal, was hanged, notwithstanding the safe-conduct which had been given him. Others, whose guilt was not sufficiently proved, were tortured, deprived of their dignities, and banished. The conduct of the pope in this instance was neither magnanimous nor merciful. Leo's magnificence had exhausted his finances. To procure money, particularly for the completion of St. Peter's, he put all Christendom under contribution by the sale of letters of indulgence. This abuse roused the zeal of Luther, and incidentally promoted the Reformation. Leo at first paid little regard to the attacks of Luther, and when he could no longer keep silence, was inclined to lenient measures. In compliance with the wishes of Maximilian he assumed more rigour, and summoned Luther to appear in Rome, but finally agreed that he should defend himself at Augsburg before Cardinal Cajetan. Nothing being decided by that measure, he issued in November, 1518, the well-known bull in which he defended the Papal authority of dispensing indulgences, and threatened all who maintained contrary doctrines with excommunication, on which Luther appealed to a general council. While open war had thus broken out in the church, Leo endeavoured to unite all Christian monarchs in a crusade against the Turkish emperor Selim, who had made himself master of Egypt; but their mutual jealousies prevented the execution of his plan. Besides these public chagrins Leo had great domestic misfortunes to suffer. Lorenzo, who had connected himself with the French court by marriage, having died and left only a daughter, Leo annexed Urbino to the States of the Church, and the Cardinal Giulio

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de' Medici was placed in the government of Florence. Though in Germany the Reformation continued to gain ground, Italy was not disturbed by foreign wars. This state of things permitted Leo to indulge his taste for splendour, to promote the arts and sciences, and at the same time to increase the power of his family. Although in alliance with France, he did not give up his plan of preventing the aggrandizement of that power in Italy. With this view he united with the emperor in 1521 for the re-establishment of the family of Sforza in Milan, and took Swiss troops into pay. The war was begun successfully; Parma and Piacenza were taken by the Papal troops, and annexed to the States of the Church. The allies entered Milan without resistance, and occupied the territory of the Duke of Ferrara, whom Leo had excommunicated as an ally of France. While engaged in celebrating his successes Leo died suddenly, December 1, 1521. The age of Leo is described in Roscoe's Life and Pontificate of Leo X., which has been translated into German, Italian, and French.

LEOBEN, a town of Austria, in Styria, 25 miles N.N.W. of Gratz, on the right bank of the Mur. It is walled, entered by three gates; has a large and handsome square, adorned with three fountains; a deanery church, town-house, and theatre, extensive iron and steel works. Both coal and lignite are worked to a considerable extent in the vicinity. The preliminaries of the Peace of Campo Formio were signed here, 18th April, 1797. Pop. (1880) 5491.

LEOBSCHÜTZ, or LUBCZYCE, a town of Prussia, province of Silesia, 31 miles S.S.W. Oppeln, capital of a circle, on the Zinna. It is walled, flanked with ten towers, has a law court, and several public offices, an old Franciscan monastery, occupied as a Roman Catholic gymnasium, and two hospitals; manufactures of woollen and linen cloth, ribbons and leather, and a fulling-mill. It carries on a considerable trade in wool, flax, and grain. Pop. (1880) 12,018.

LEOMINSTER, a parliamentary and municipal borough and market town of England, county of Hereford, 12 miles north of Hereford, in a fertile valley on the right bank of the Lugg. It has some wide and well-paved streets, retaining a few of its antique-looking houses of timber and brick. There are here a town-hall and jail, a corn exchange, and a reading-room. The priory church (restored and enlarged in 1866 and 1879), is a venerable and spacious edifice abounding with fine specimens of Norman and Early English architecture. None of the other places of worship are architecturally remarkable. Leather glove making is the chief industry; and there are tanning and leather dressing establishments, iron and brass foundries, and manufactures of agricultural implements. The wool and hops produced in the neighbourhood are much esteemed, and the town has long been famed for the quality of its cider. The foundation of Leominster dates as far back as the reign of Merwald, king of Mercia. The borough returns one member to Parliament. The municipal and parliamentary limits are coextensive. Pop. in 1881, 6042.

LEOMINSTER, a town of the United States, Worcester county, Massachusetts, on the Nashua river, 40 miles W.N.W. of Boston. There are about six churches, 20 schools, and a public library. Leominster is well lighted with gas and abundantly supplied with water. It is the centre of the comb manufacture of the state, and has also paper and piano manufactories, large cabinet works, an extensive manufactory of perambulators; tanning, currying, and other industries are also carried on. The town is surrounded by some of the most fertile farm land in the county. Pop. (1880), 5772.

LEON, one of the great divisions of Spain, formerly a kingdom, is bounded north by Asturia, east by Old Castile, south by Estremadura, and west by Portugal and Galicia. It was united to Castile in the beginning of the eleventh century. It is divided into the provinces of Leon, Zamora, and Salamanca.

LEON, a town of Spain, capital of the province and ancient kingdom of the same name, on a low and level tract in the angle formed by the confluence of the Torio and the Bernesga, each of which is here crossed by a bridge, 176 miles north-west of Madrid. It is built in the form of an octagon, surrounded by ancient walls in a somewhat dilapidated state, and entered by eleven gates. The streets are generally narrow, irregular, ill-paved, and dirty. The principal edifice is the cathedral, a beautiful specimen of the purest Gothic, with a façade composed of five richly sculptured pointed arches, and flanked by two remarkably elegant and lofty towers. The church of San Isidoro, an ancient massive structure, should also be mentioned, as well as a fine old palace, called La Casa de los Guzmanes. The manufactures consist chiefly of linen goods, once the great staple of the town, but now almost extinct; leather, hats, and earthenware. There is no trade worthy of the name. Pop. 11,515.—The province of Leon is situated in the north-west of Spain, and has the Asturias as its northern boundary, a branch of which mountains divides it into two portions. The western portion is so rugged as to be adapted rather for pasture than tillage, but the eastern sloping from the ridge of the Asturias ultimately merges into wide and undulating plains, on which the vine and various grain crops are successfully cultivated. Iron is produced, and other minerals are found. The trade is unimportant. Area, 6166 square miles. Pop. 350,210.

LEON, a town, Central America, capital of Nicaragua, on a large and fertile plain near the pacific coast. It is laid out on a regular plan, in spacious streets, with intervening squares. The public buildings are considered among the finest in Central America, and include a large and massive cathedral, crowned by a lofty central dome, and flanked by two towers. Other buildings are the old Episcopal palace (built 1678) surrounded by fine gardens; the new Episcopal palace (1873), the churches of La Merced, Recoleccion, and Calvario, remarkable for their size and fine façades, and various other churches; the Tridentine College of St. Ramon, once a flourishing establishment, with professorships of law and medicine, and numerous students, but now possessed only of a nominal existence; the government-house, Cuartel General or head barracks, and the hospital, occupying the old convent of San Juan de Dios. The manufactures of Leon are confined chiefly to articles in dressed leather and cutlery; and the trade, owing to its inland situation, does little more than supply its local wants, but the construction of a railway between Leon and Coronto on the coast (completed in 1881) is expected to improve the state of trade. The markets are well supplied, and display fruits and vegetables in great variety and almost boundless profusion. The town has had its full share in the civil commotions of the country, and there are entire squares of ruins that were once palaces. Pop. about 25,000.

LEONARDO DA VINCI. See VINCI.

LEONARD'S, ST. See HASTINGS.

LEONFORTE, a town of Sicily, in the province of Catania, and 37 miles W.N.W. of Catania. It is walled, and consists chiefly of an extensive square, opened into by two spacious well-built streets. It carries on a considerable trade in corn, wine, and silk. Both asphaltum and sulphur are found in the neighbourhood. Pop. 11,937.

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LEONIDAS, King of Sparta, son of King Anaxandrides, ascended the throne 491 years B.C. When Xerxes, king of Persia, invaded Greece, the Greek Congress assigned to Leonidas the command of the force destined to defend the pass of Thermopylæ. His force, according to Herodotus, amounted to over 5000 men, of whom 300 were Spartans. After the Persians had made several vain attempts to force the pass, a Greek named Ephialtes betrayed to them a mountain path, by which Hydarnes led a body of Persians to attack Leonidas in the rear. Before this manœuvre could be completed, Leonidas, dismissing all his allies except the Thespians and Thebans, and advancing from the pass, threw himself upon the main body of Xerxes' army. Leonidas fell early in the action, and a desperate struggle afterwards took place over his body, which was rescued by the Greeks. This event took place in B.C. 480. A monument was erected to Leonidas on the spot where the Greeks made their last stand.

LEONINE VERSE, a kind of Latin verse, in vogue in the middle ages, consisting of hexameters and pentameters, of which the final and middle syllables rhyme; so called from Leonius, a poet of the twelfth century, who made use of it, or, according to some, from Pope Leo I. (A.D. 680). Poems of considerable length were written in this barbarous taste. The following distich may serve as an example—

'Dæmon languebat, monachus tunc esse volebat;
Ast ubi convaluit, mansit ut ante fuit.'

LEONTODON, PRODUCTS OF. The roots of dandelion, when pressed, yield a juice the characters of which are different at different seasons; it is sometimes used medicinally. There are other preparations from dandelion, such as the decoction, the extract, and the juice, the last being made by pounding the root in a mortar, adding rectified spirit, and filtering after some days. From the fresh milky juice, by adding water, warming, filtering, and evaporating, a bitter principle has been got, upon which the name *taraxacin* has been conferred. It forms white warty masses, which fuse readily and are soluble in hot water, but not in cold. Another crystalline substance, called *taraxacerin*, has also been got from the alcoholic extract of the evaporated juice.

LEONTODON TARAXACUM. See DANDELION.

LEOPARD (*Felis leopardus*, Pl. XXIX.–XXX. fig. 6). This beautiful animal is included in the family Felidæ, order Carnivora, and enjoys a very wide distribution over the African continent, extending into Asia as well. The leopard is thus a characteristic inhabitant of the tropical parts of the Old World, and in America its place is taken by the jaguar (which see). The ground or general body-colour is a yellowish fawn, which is slightly paler on the sides, and becomes white on the under aspect of the body. The head, neck, back, limbs, and under surface are marked with black spots of various sizes, irregularly dispersed over these parts; whilst the sides are marked with black spots of a larger size, each consisting of a circle of smaller spots. There are ten rows of these spots, and they are smaller than those of the nearly-allied panther. In general appearance and conformation the leopard is tiger-like, and retains much of the savage qualities and instincts of his larger neighbour. Whilst exhibiting certain variations in appearance, the leopard species has not been found susceptible of division into more than one distinct form. The prey of this animal consists of antelopes, monkeys, and smaller quadrupeds; and amongst defenceless animals, such as sheep, &c., they commit dreadful havoc in a very short space of time. Kolbe states that a pair of leopards and three young ones entered a sheep-fold at the Cape of Good Hope, and soon killed nearly a hundred sheep, and after feeding their young attempted to move off, each carrying a carcass, when they were waylaid and killed. The leopard appears rarely to attack man save in exceptional circumstances, or when closely pursued and brought to bay. This animal can ascend trees with great ease, and often pursues his prey thither with success; whilst, when hunted, he may take refuge amid the foliage. Unless when taken very young, the leopard is insusceptible of being tamed or domesticated. These animals are captured in pitfalls, which are slightly covered with branches of trees, on which pieces of meat are placed as bait. The flesh is said to be excellent, and to resemble veal in taste. The skins sell in Europe from £5 to £10. The Hunting Leopard or Cheetah (*Felis jubata*) of Southern Asia and Africa is about the size of a large greyhound, and has a narrow chest, long legs, and slender body. It appears to connect together the Canidæ, or Dogs, and the true Felidæ. The body-colour is a pale fawn, which runs into white below; the back and sides are spotted with black spots, simply scattered over the coat, and not arranged in circles as in the leopard. A slight mane is present, which extends along the back, and the tail is long and curled. The claws are not fully retractile. Susceptible of a high degree of domestication, this animal is trained in India and Persia to hunt antelopes, and for that purpose is carrried to the field in a cart, chained and hooded. When the game is in view the hoods are removed, and the attention of the cheetahs is directed to the antelopes. The animal then cautiously steals towards the herd, and when within a near distance springs forward with a few bounds calculated to bring him upon the prey. When successful the cheetah is induced to leave the prey by coaxing, and by pieces of meat being thrown to him. If the antelope escapes the first onslaught of the cheetah the superior swiftness of the former soon places it in safety; and the cheetah once having missed its prey does not attempt to follow, but returns to his keepers with a slouching gait and mortified air. In confinement the cheetah is said to be docile, and destitute of the savage impulses of his larger neighbours.

LEOPARDI, GIACOMO, CONTE, poet and philologist, was born at Recanati, in the March of Ancona, in 1798. He conducted his own education almost alone with the aid of his father's library, and before the age of sixteen had acquired, besides his native language, Latin, Greek, Hebrew, French, Spanish, and English. By this age he had edited and published various Greek manuscripts, among others twenty-five fragments of fathers of the church, written a History of Astronomy, and translated, with learned notes, the Vita Plotini of Porphyrius. He also translated into Italian verse the Battle of the Frogs and Mice, some fragments of the Odyssey, the Æneid and the Titanomachia of Hesiod. A commentary on Petrach, and an essay on the errors of the ancients, appeared in 1815; and in 1818–20 his Canzoni appeared in the Spectator of Milan, and raised him to the first rank of lyric poets. He corresponded with Niebuhr, Giordani, Akerblad, Boissonade, and other eminent philologists, who welcomed him as an accession to their ranks. In 1817 he was chosen a member of the Academy of Sciences of Viterbo. In 1822 Niebuhr offered him at Rome the chair of Greek philology in the University of Berlin, which he declined. His too great application had already undermined his health, and symptoms of the pulmonary disease of which he died had begun to manifest themselves. After travelling through Milan,

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Bologna, and Pisa he settled at Florence, where some generous friends provided for his wants. Here he wrote his Paralipomeni, and published his Canzoni (1831) by subscription. In 1831 he removed to Naples, where he passed the closing years of his life, relieved by the cares of Ranieri and his sister. He died 14th June, 1837. The following editions of his works have been published since his death:—Excerpta ex schedis criticis Jacopi Leopardi comitis (Bonn, 1834); I Paralipomeni della Batracomiomachia, poemetto in ottava rima e in otti canti (Florence, 1842); Studii filologici, raccolti e ordinati per cura di P. Giordani e P. Pellegrini (second edition, one vol. 16mo, Florence, 1845); Saggio sopra gli errori popolari degli antichi publicato per cura di Prospero Viani (one vol. 8vo, Florence, 1846); Epistolario de G. Leopardi raccolto da Prospero Viani (two vols. 16mo, Florence, 1849).

LEOPOLD I. See GERMANY—History of Germany.

LEPANTO, or EPAKTO (ancient *Naupactus*), a seaport town of Greece, in the nome of Phokis, on the Gulf of Corinth or Lepanto, near the strait of Lepanto. It is at present a very insignificant place, and owing to the silting up of its harbour has almost no trade, but was anciently of considerable importance. It is memorable for the naval battle fought within the gulf on 7th Oct. 1571, between the Ottoman fleet and the combined fleets of the Christian states of the Mediterranean, under Don John of Austria, when the former, consisting of 200 galleys and 60 other vessels, was destroyed. Cervantes, author of Don Quixote, distinguished himself in this battle, and received three wounds, one of which cost him the use of his left arm ever after.—The strait connects the Gulf of Corinth with the Gulf of Patras, and is about 1 mile wide at its narrowest part, which is defended by a castle on either side.

LEPAS, the scientific (generic) name of the barnacles. See BARNACLE.

LEPER. See LEPROSY.

LEPER-HOUSES. The general belief in the prevalence of leprosy in Europe during the middle ages, whether well or ill founded, led to the establishment of numerous houses for the treatment of this disease. These were very numerous in England. Nearly every important town had one or more of these houses; Norwich had six and Lynn Regis five. The house of Burton Lazars in Leicestershire, built by Roger de Mowbray out of a general subscription raised over England in the time of King Stephen, and dedicated to the Virgin and Lazarus, was the head of all lazar-houses, as they were called, in England. It was dependent on the leper-house at Jerusalem. From the time of the Crusades until the time of the Reformation these houses continued to flourish, and new foundations to be made. Gradually, however, as better habits and treatment began to diminish diseases of the class for which they were used, and better diagnosis to show that many diseases taken for leprosy did not require separate treatment, these houses declined, and were abandoned or appropriated to other objects. In the appendix to Cleland's Statistical Tables of Glasgow there are two notices of the lazar-house. The last, in 1586, refers to an order (October 20) of the kirk-session, then apparently the most active governing body in Glasgow, ordaining some to visit the 'leper-folks' house or spittal beyond the brig, to see how the same may be reformed.' On December 9 the session requests the magistrates to put all lepers out of town, for fear of infection.

LEPIDINE ($C_{10}H_9N$). A base homologous with chinoline (which see), which accompanies it in the distillation of quinine or cinchonine with potash. It is an oily fluid, of specific gravity 1·072, and boils between 510° and 520° Fahr. It is a strong base, combining with the acids and forming crystallizable salts. With iodide of amyl it forms a substitution compound which, when treated with potash, gives a polymerized compound of a rich blue colour. It is one of the constituents of the commercial blue substance cyanine, which is got from the crude distillate of cinchonine with potash. The polymerized substance is called *pelamine*, and is also a base. A substance identical in composition with lepidine has been separated from coal-tar oil; it is distinguished, however, by its boiling between 485° and 494° Fahr., and by its amyl derivative giving no blue compound with an alkali. This substance, therefore, which has been called *iridoline*, is the homologue of *leucoline* (which see).

LEPIDODENDRON (Greek *lepis*, scale, and *dendron*, tree), a genus of fossil plants, cryptogamic and acrogenous. The stalks are dichotomous, the leaves simple, linear or lanceolate, but only towards the extremity. They are found only in the coal-measures, where Brongniart has counted thirty-four species, which he has formed into a genus of the family *Lepidodendra*, which he formed out of the Lycopodiaceæ. Lindley considers them as allied to the Norfolk Island pines, and consequently as bearing the closest resemblance to the Coniferæ. In the *L. Sternbergii* the stalks are regularly marked with rhomboidal spaces, which mark the base of the leaves. They are found from 20 to 45 feet in length, and some of 4½ feet in diameter. They are frequently met with in the north of England. *L. selaginoides* has circular scars, and short, compactly imbricated leaves. *L. oboratum* has obovate areolæ, with a rounded apex, a tapering base, the central ridge even and undivided, and the scar at the apex of the areolæ bounded by a nearly circular outline. *L. elegans* has smaller and more delicate branches and leaves than the *L. Sternbergii*, with similar scars.

LEPIDOLITE, or LITHIA MICA (Greek, *lepis*, a scale), occurs in oblique rhombic or hexagonal prisms, or in masses composed of small crystalline scales. Its colour is pink or peach-blossom, passing into gray; lustre pearly; easily split into thin translucent flexible scales or plates. It is composed of silica 43–52, alumina 20·5–28, potash 9·5–10·9, lithia 1·2–4·7, and variable quantities of iron, manganese, lime, magnesia, soda, rubidia, cæsia, chlorine, fluorine, and water. It is regarded as a silicate of aluminium and lithium, with fluoride and silicate of potassium. When heated it swells up, gives off much hydrofluoric acid, and melts to a glass, the colour of which depends on the iron and other metals present; at the same time the blowpipe flame acquires a rich red colour from the lithia. It is attacked, though slowly, by acids. It is found in Cornwall at St. Michael's Mount, Loch Leven in Scotland, in Saxony, Bohemia, Russia, and other parts of Europe, and at many localities in the United States. The mineral is one of the principal sources of the metal lithium, compounds of which are used both in medicine and in the arts.

LEPIDOPTERA (Greek, *lepis*, a scale; *pteron*, a wing), the scientific name of the order of insects which includes the butterflies and moths (which see), and which is so named from the presence of innumerable small membranous scales, which come off like fine dust or powder when the wings are touched by the finger. The scales are merely modifications of the hairs with which the wings of most other insects are covered; and from the presence of these scales the beautiful tints and colours of the Lepidopterous insects are derived. These structures vary much in form and shape in the different genera and species

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of the order. The wings are four in number, and are membranous. The mouth is eminently of the suctorial kind, adapted for sucking the juices of flowers. The larvæ form the well-known 'caterpillars,' so destructive to the leaves of plants. The Butterflies form the *diurnal* Lepidoptera; whilst the Moths, flying about chiefly at twilight or during night, are termed *crepuscular* or *nocturnal* Lepidoptera.

LEPIDOSIREN (Greek, *lepis*, a scale, and *seiren*, a siren), the scientific appellation of the mud-fishes of the rivers Gambia and Amazon. See DIPNOI.

LEPIDOSTEUS (Greek, *lepis*, a scale, and *osteon*, a bone), the generic name of the bony pike of the North American lakes. See BONY PIKE.

LEPIDUS, M. ÆMILIUS, the Roman triumvir, son of the consul M. Lepidus, was prætor B.C. 49, consul with Julius Cæsar in 46, and in 44 received from Cæsar the government of Narbonese Gaul and Nearer Spain. He was in Rome at the time of Cæsar's death, and joined Mark Antony. He succeeded Cæsar as Pontifex Maximus. He then retired to his government. Antony fled to him after his defeat at Mutina (43). As they advanced to Rome they were joined in the north of Italy by Octavianus, and in the month of October these three formed the triumvirate, and divided the Roman world amongst them. After the battle of Philippi (42) a redivision took place, in which Lepidus received Africa, where he remained till 36, when he was summoned by Augustus to assist him against Sextus Pompey. He then tried to seize Sicily, but was overcome by Augustus, who deprived him of his triumvirate, and banished him to Circeii, where he lived under strict surveillance. He died B.C. 13.

LEPISMA, the genus of Thysanourous ('tuft-tailed') insects, to which the popular names of 'sugar-mites' and 'sugar-lice' have been applied, and the minute scales of which are frequently employed as test-objects for microscopes, on account of the delicate markings which they bear. The *Thysanura* form an order of lower insects destitute of wings, which undergo no metamorphosis, and which possess curious bristles or filaments attached to the tail or abdomen by means of which they make considerable leaps. The *Lepismæ* are minute insects the common species of which (*L. saccharina*) are found in the sash-frames of windows, under wet planks, or in similar and damp situations. They are of small size, have a spindle-shaped body, and possess a terminal row of bristles at the tail, three of which are elongated and made use of as organs for effecting springing movements. The head is generally bent under the thorax, and is provided with large compound eyes. The six legs are short. The antennæ or feelers are greatly elongated. They appear to hide during the day, and to come out of their hiding-places during the night.

LEPROSY (Greek, *lepra*), a name given to several different diseases. The elephantiasis is sometimes called *leprosy of the Arabs*. The *leprosy of the Jews* is distinguished by white cutaneous spots, composed of smaller spots, which appear sometimes in one place and sometimes in another, and are covered with a rough scaly matter. It appears to have been the *leukē* of the Greek writers. The *Greek leprosy* is characterized by hard, insensible tubercles, which appear upon the skin, and are accompanied by a progressive insensibility and the loss of the voice. It is endemic in Egypt, Java, and some parts of Norway and Sweden. The use of unhealthy articles of food seems to be one of its causes. It is hereditary and contagious. It was introduced into Western Europe in the time of the Crusades, but has gradually disappeared. The tubercles which characterize leprosy appear in different parts of the skin; they are hard, rough, and numerous, and cause the loss of the hair at the places where they appear. They finally terminate in ulcers, which penetrate even to the bone, producing a caries. They also cause the separation of parts of the body, the toes and fingers, for example, dropping off. These symptoms are accompanied with a languor in the motions, a dulness of the senses, a change of the voice, offensive breath, and lethargy. There are three sorts of leprosy—the *squamous* or scaly, the *crustaceous*, in which the skin is covered with crusts, and the *tuberculous*. The remedy recommended for this disgusting disease is light food, such as vegetables, soups, milk; sulphur baths, sudorific drinks, and mercury, are sometimes prescribed. But all remedies are too frequently unavailing. In the middle ages leprosy, under all the forms of disease to which this term has been applied, seems to have been very common and general. It should, however, be observed, that almost all cutaneous disorders were considered as of a leprous nature, and treated as such. From the sixth to the fifteenth century these loathsome disorders attracted the attention of lawgivers and of the benevolent, and we find numerous ordinances relating to lepers, affecting their civil rights, and great numbers of lazar-houses in all the countries of Europe. In the historians of those times, therefore, we are to consider the word *leprosy* as used indiscriminately of all cutaneous diseases; and we may well be astonished and shocked to find that all such patients were treated somewhat after the manner prescribed in Leviticus for the Jewish leprosy. They were, in fact, treated as civilly dead; their funeral obsequies were performed, and masses said for the benefit of their souls. Their marriage ties were dissolved, but a leper might enter into a new connection with a person who was also afflicted with the disease. They were allowed to enter the cities at certain seasons, but were required to give notice of their approach by sounding a rattle. The consequences of such a treatment may be easily imagined. The improved condition of the lower classes in food, clothing, and manner of living in general, and the advancement of medical science, have contributed to eradicate this loathsome and disgusting malady.

LEPTOCARDIA (Greek, *leptos*, small; *cardia*, heart), Müller's name for the lowest order of fishes, which is solely represented by the lancelet (which see). This term was applied to the lancelet order in allusion to the rudimentary or imperfect condition of the heart, which in this fish is represented by contractile dilatations situated on the larger blood-vessels, and through which the circulation is maintained.

LERICI, a town of Northern Italy, in the province of Genoa, on the eastern shore of the Gulf of Spezzia, 57 miles E.S.E. of Genoa. It is pleasantly situated; is defended by a castle; has a church, with some good paintings; a Capuchin monastery; several palaces, adorned with stuccoes and marble façades; and a harbour, which is much frequented by coasting vessels. The fishery on the coast is productive. Pop. 5217.

LERIDA (ancient *Ilerda*), a town of Spain, province of Lerida, Catalonia, on the right bank of the Segre, here crossed by a handsome bridge of seven arches, 84 miles W.N.W. of Barcelona. It was originally the capital of the Ilergetes, and suffered much both from the Carthaginians and the Romans. In its vicinity Scipio defeated Hanno, and long after Julius Cæsar defeated Pompey's lieutenants Afranius and Petreius. It afterwards fell into the hands of the Goths, and passed from them to the Moors, who held it till Raymond Beranger, king of Arragon, wrested it from them, and made it the capital of his kingdom. Its situation having caused it to be regarded as the

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key of Arragon and Catalonia, it was early fortified, and still continues to be one of the most important military points in Spain. In addition to walls flanked with bastions and a wet fosse, it is defended by a castle and several batteries. As a town it is very indifferently built, and, owing chiefly to the ravages of war, presents a very dilapidated appearance. Its principal edifices are the old cathedral, in an incongruous mixture of styles, but with some fine specimens of early art; the new cathedral, an imposing Corinthian structure; the very ancient church of San Lorenzo, supposed still partly to consist of a heathen temple; the church of San Juan, with a remarkable Byzantine porch; the town-house, court-house, bishop's palace, diocesan seminary, gymnasium, theatre, and civil and military hospitals. The manufactures consist of woollen and cotton goods, leather, paper, glass, and earthenware, and there is a considerable trade in corn and timber. Pop. 20,369.—The province, bounded north by France, north-east by Gerona, east by Barcelona, south-east by Tarragona, south-west by Teruel, and west by Huesca, has an area of 4774 square miles. It is traversed by ramifications of the Pyrenees, which are generally well wooded and rich in minerals, and has many fertile plains and valleys, which are better cultivated than usual in Spain. The inhabitants also are far more industrious. Pop. in 1877, 285,297.

LERNÆA, a genus of lower Crustaceans, included in the order Epizoa or Parasita of that class, the members of which, as implied by the term *Parasita*, live as parasites upon various fishes, to whose skin, fins, eyes, or gills they attach themselves by their hooked legs, or by specially developed suckers. The Lernæas comprise forms which in their adult state appear as mere sac-like bodies, adhering to some part of their hosts by two sucker-like legs, and which subsist by sucking the juices of the animal through a proboscis situated anteriorly. The *Lernæa monilaris*, which attaches itself to the eye of the sprat, may be cited as a familiar example of the group. This form buries its proboscis into the eye of the unfortunate fish, and being phosphorescent in the dark gives a luminous appearance to its victim, whence the afflicted sprats are known as 'lantern-sprats.' The female Lernæans are far larger than the males, as, indeed, is the case with the generality of the lower Crustacea. The male animals generally adhere to the female animals, and are thus parasitic on the latter. In their development the Lernæans exhibit a close resemblance in the early stages of their life-history to the Copepoda, of which group the 'water-fleas' form familiar examples. The young Lernæan first comes from the egg as a little free-swimming body, provided with eyes, antennæ, and locomotive limbs. In this state it resembles one of the Copepoda. As maturity is attained, the limbs, eyes, and other organs of sense disappear, and the Lernæan now assumes the lower and sac-like conformation characteristic of its adult state. Such a development, showing a progress from an apparently high type of structure towards a lower and degraded type, is termed 'retrograde development.' The reproductive organs, however, are not developed within the free, active larva, but appear only in the attached and adult parasitic form. The ovisacs, from which the ova or eggs are expelled, are attached to the extremity of the abdomen of the Lernæa. The Lernæas are thus regarded as corresponding to Copepoda that are modified to a parasitic existence. This view is borne out by the fact that some male Lernæans do not evince a retrogression in development, but remain permanently in the condition of the free-swimming, adult Copepoda.

LERWICK, a seaport town in Scotland, capital of Shetland, in Bressay Sound, on the south-eastern shore of Mainland. It consists of a principal street, leading to the harbour and opened into by a number of lanes. The town is losing its antique Norwegian appearance, and churches, schools, banks, &c., of modern architectural style are being rapidly built. There are no manufactures of any consequence; but the trade, greatly favoured by the fine anchorage in the bay, with easy access both from the north and south, is considerable. Regular steam communication is maintained with Kirkwall, Wick, Aberdeen, and Leith. Many of the inhabitants are employed in the fisheries. Pop. 4772.

LE SAGE, Alain René, a celebrated French novelist and dramatic writer. He was born May 8, 1668, at Sarzeau, a small town in Brittany, and was the son of a lawyer, who held an office in the royal court of Rhuys. His father dying in 1682, he was placed under the guardianship of an uncle, who dissipated the fortune of his ward. He studied at the college of the Jesuits at Vannes, after which he appears to have been employed in his native province for five or six years. In 1692 he went to Paris to study law. His talents and manners procured him admission into the best society, and in 1694 he married a young lady of great beauty but no fortune. His subsequent life was quiet, domestic, and unadventurous. To procure a livelihood he abandoned the law and took to literature, at first in a line little suited to his talents. He translated for a bookseller. The Abbé de Lyonne, who procured him a small pension of 600 livres, recommended to him as a source of inspiration the Spanish Romances, from which his future literary successes were mostly drawn. His first attempts were in imitation of the Spanish drama. Le Point d'Honneur was played with success at the Théâtre Français in 1702. He subsequently translated Avellaneda's continuation of the Adventures of Don Quixote; and a comedy of Calderon; but his first success was with an entirely original work, which displayed his reputation as a writer of comedy, Crispin rival de son Maître (1707). Le Diable Boiteux, imitated from a Spanish romance, El Diablo Cojuelo, appeared the same year. Turcaret, a comedy produced soon afterwards, by the opposition it excited among the farmers-general, whom it satirized, and the difficulty of procuring its representation, disgusted him with the theatre. In 1715 he published the first two volumes of Gil Blas, which is esteemed by critics as one of the best romances in the French language; the third volume of this work appeared in 1724, the fourth in 1735. During the time he was occupied with Gil Blas he had to borrow money on the MS. in advance, and the necessity of writing for subsistence is too evident in many of his other productions. He resumed writing theatrical pieces for itinerant companies, and produced more than a hundred of them, the principal of which have been published along with those of other writers, in ten volumes 12mo, entitled Théâtre de la Foire (1737). These are not without talent, but the sacrifices made to the popular taste and the obscenities indulged in in them are severely condemned by La Harpe. A charge of pandering to a corrupt taste has been made against all the writings of Le Sage. Sir Walter Scott defends Gil Blas against it by pointing out the distinction between recounting the adventures of knaves and libertines and exciting sensuality by impure imagery and suggestions. In 1732 he published Les Aventures de Guzman d'Alfarache (two vols. 12mo); and the following year Les Aventures de Robert, dit le Chevalier de Beauchesne (two vols. 12mo), containing the real history of a freebooter, from papers furnished by his widow. In 1734 appeared L'Histoire d'Estevanille Gonzales (two vols. 12mo); and in 1735 an amusing dialogue, entitled Une Journée des

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Parques (12mo). The last of his novels was Le Bachelier de Salamanque, which La Harpe considers as inferior to all the preceding. He did not cease writing, but in 1740 produced a collection of satirical letters under the title of La Valise trouvée, and in 1743 a volume of anecdotes. In the year last mentioned he retired to Boulogne, where he died Nov. 17, 1747. His selected works were published by M. Poitevin in 1838; they contain Le Diable Boiteux, Gil Blas, Le Bachelier de Salamanque, Guzman d'Alfarache, Crispin rival de son Maître, and Turcaret.

LESBOS, a Greek island, situated off the coast of Mysia, now called *Mitylene*, from its capital. In shape it is nearly triangular; has an area of 276 square miles, and a population of about 40,000, and now belongs to Turkey. According to tradition, Lesbos, son of Lapithas, and grandson of Æolus, by the advice of an oracle led a colony to this island, espoused Methymna, daughter of Macareus, and younger sister of Mitylene, and received with her the dominion of half of the island, to which he gave the name of *Lesbos*, it having been previously called *Isa*, and *Pelasgia*, from the Pelasgians. The island contained forests of beech, cypress, and fir trees. It yielded marble of a common quality, and the plains abounded in grain. Warm springs were also found; agates and precious stones. The most profitable production was wine, which was preferred, in many countries, to all the other Greek wines. The island formerly contained nine cities, for the most part in a flourishing condition; among them Mitylene, Pyrrha, Methymna, Arisba, Eressus, and Antissa. Lesbos was, as indicated by the above legend, early inhabited by Æolians, who formed a powerful democracy. They afterwards made great conquests on the Continent, and even resisted the Athenians themselves. Lesbos was next disturbed by the Samians, and afterwards by the Persians, to whom it was finally obliged to submit. After the battle of Mycale it shook off the Persian yoke, and became the ally of Athens. During the Peloponnesian war it separated more than once from Athens, but was always reduced to obedience. A distinguished citizen of Mitylene, exasperated that several rich inhabitants had refused his sons their daughters in marriage, publicly accused the city of an intention to conclude a league with the Lacedæmonians, by which false accusation he induced the Athenians to send a fleet against Lesbos. The nearest cities, Methymna excepted, armed in defence of their capital, but were overpowered, the walls of Mitylene demolished, and a thousand of the richest inhabitants put to death. The territory of Methymna alone was spared. The island itself was divided into 3000 parts, of which 300 were devoted to the service of the gods, and the rest divided among the Athenians, by whom they were rented to the ancient proprietors. The cities of Lesbos, nevertheless, soon rebelled again. Alexander made a treaty with the Lesbians after the battle of Granicus, and the island was afterwards reduced by the Macedonians, and subsequently became part of the Roman province of Asia. It was placed by Constantine in the Provincia Insularum. In 1462, after being for some time tributary to the Turks, the island was taken by Mohammed II. The Lesbians were notorious for their dissolute manners, and the whole island was regarded as the abode of pleasure and licentiousness. At the same time they had the reputation of the highest refinement, and of the most distinguished intellectual cultivation. Poetry and music made great progress there. The Lesbian school of music was celebrated, and is said to have had the following origin: When Orpheus was torn to pieces by the Bacchantes, his head and lyre were thrown into the river Hebrus, and both were cast by the waves on the shore of Methymna. Meanwhile, harmonious sounds were emitted by the mouth of Orpheus, accompanied by the lyre, which was moved by the breath of the wind. The Methymnians therefore buried the head, and suspended the lyre in the temple of Apollo. In return the talent of music was conferred on them by this deity. In reality Lesbos produced musicians superior to all the other musicians of Greece. Among these the most distinguished were Arion of Methymna, and Terpander of Antissa. Alcæus and Sappho were esteemed the first in lyric poetry. Pittacus (one of the seven wise men), the philosophers Theophrastus and Theophanes (the bosom friend of the great Pompey), and the historians Hellanicus, Myrtilus, &c., were also natives of this island. It was often chosen as a place of residence by distinguished foreigners. Epicurus and Aristotle taught there.

LESINA, or LESSINA, an island in the Adriatic, on the coast of Dalmatia, consisting of a long and narrow belt, stretching east to west for 40 miles, with a breadth of 2 to 6 miles, and presenting a continuous chain of hills, which, descending to the coast, form lofty and precipitous cliffs. The arable ground is of very limited extent, but the climate is remarkably mild, and both the wine and fruit are exquisite. Much of the surface is covered with rosemary, from the flowers of which a spirit is distilled called *aqua di regina*, and greatly resembling *eau de Cologne*, while the leaves yield an oil known in commerce by the name of *oleum anthos*. The principal town, bearing same name, is on the south-west coast. It rises from the shore in the form of an amphitheatre, is defended by two forts, and has a cathedral, seminary, a large vaulted building, which was used by the Venetians as a naval arsenal; and a good natural harbour. Pop. of the island, 13,000; of the town, 2023.

LESLIE, an ancient Scottish family, from which have sprung several individuals distinguished in history, or in the annals of literature, science, and art. The family was descended from BARTHOLOMEW, a Flemish chief, who settled in Garioch, Aberdeenshire, in the reign of William the Lion. He obtained the barony of Leslie, from which his descendants took their name.—NORMAN DE LESLIE, the fourth in descent from him, swore fealty to Edward I., and was in 1305 named by him Sheriff of Aberdeenshire. His son ANDREW, in 1320, signed the letter to the pope asserting the independence of Scotland. Andrew's second son, WALTER, married the heiress of the Earl of Ross, and became the ancestor of a new line of earls. His fourth son, GEORGE, founded the family of Leslies of Balquhain, who became the earls of Leven in Fifeshire, where the family acquired lands. From a subsequent branch of the family also sprung the earls of Rothes. In the sixteenth century several Leslies held important military commands on the Continent.—ALEXANDER LESLIE, earl of Leven, as field-marshal of Sweden, defended Stralsund against Wallenstein. He subsequently took part in the battle of Marston Moor, and served as a volunteer in the battle of Dunbar.—DAVID LESLIE, afterwards Lord Newark, served under Gustavus Adolphus in Sweden, and under the Earl of Leven at Marston Moor. He commanded at Dunbar. Another Leslie served in the Thirty Years' war, but was distinguished rather by a dark intrigue than by open valour, being one of the conspirators who were rewarded by the Emperor Ferdinand II. for the murder of his general, Wallenstein. See the article LESLIE (DAVID).

LESLIE, CHARLES ROBERT, a distinguished painter, was born in London, October, 1794, but when very young was taken by his parents to the United

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States, where, in process of time, he was apprenticed to a bookseller in Philadelphia. His turn for art, however, soon discovered itself, and some gentlemen who were led to take an interest in him recommended his return to England, and he accordingly proceeded thither, and became a pupil at the Royal Academy about 1813. From the first his genius developed itself in the representation of scenes from Shakspere and the old novelists, and other subjects illustrative of olden times. Among his most successful early pictures were Anne Page and Slender (1819); Sir Roger de Coverley going to Church (1820); and May-day in the Reign of Queen Elizabeth. In 1824 he produced Sancho Panza and the Duchess, the first of his pictures from Don Quixote—a work which, throughout his career, furnished him with some of his most favourite subjects. Another scene from the Spectator, Sir Roger de Coverley having his Fortune told by Gipsies, was exhibited in 1829; and Uncle Toby and the Widow Wadman, from Tristram Shandy, in 1831. Towards the end of 1833 he was appointed professor of drawing in the United States Military Academy at West Point, and accordingly proceeded to America to assume that post; but the occupation was not congenial to him, and after holding it for five months he returned to London. Leslie's pictures are so numerous that we must content ourselves with mentioning a few of the principal ones in addition to those already referred to: Charles II. and Lady Bellenden Breakfasting in the Tower of Tillietudlem, from Old Mortality, exhibited in 1836; Reading the Will, from Roderick Random, exhibited in 1848; Lady Jane Grey prevailed on to accept the Crown; The Queen receiving the Sacrament at her Coronation; and The Christening of the Princess Royal, which three last are all well known by engravings. There are also scenes innumerable from Shakspere, Sterne, Molière, Goldsmith, and Cervantes. The forte of this artist consists in dramatic and imaginative painting, his scenes being almost perfect realizations of the conceptions of their respective authors. Thoroughly original in his mode of treatment, and uninfluenced by any conventional rules, having never, it is believed, visited Italy, his works will ever remain as admirable specimens of the genuine English school. He was elected an associate of the Academy in 1821, an academician in 1826, and was a constant contributor to the society's exhibitions. From 1848 to 1851 he was professor of painting at the Academy. He died 5th May, 1859.

LESLIE, David, Lord Newark, a celebrated general and Presbyterian leader, born in Fifeshire in the early part of the seventeenth century, entered the service of Gustavus Adolphus, king of Sweden, and under that celebrated hero so distinguished himself as to be made a colonel of horse. Having returned to Scotland about the commencement of the civil wars, he was appointed major-general, and in 1644 accompanied the Earl of Leven with the Scottish force sent into England to assist the Parliament, and took a prominent part in the battle of Marston Moor by supporting Cromwell with his Scottish horse in the celebrated charge which decided the victory. The royalists, meanwhile, headed by Montrose, had been as successful in Scotland as they were unfortunate in England, and gained the battle of Kilsyth in 1645. Leslie and his horse were recalled, and succeeded in completely surprising Montrose in Ettrick Forest, and putting him to flight after a sanguinary conflict. Shortly after this achievement, for which he was rewarded by the committee of estates with a gold chain and 50,000 merks, Leslie rejoined the Earl of Leven, then engaged in the siege of Newark. A change of politics having now taken place, the Scottish army returned home, and Leslie was employed for some time in putting down insurrection, chiefly in the north and west among the Highlanders. In 1648, when the Duke of Hamilton set out on his ill-fated expedition for the rescue of Charles I., Leslie was offered the command, but declined it. At a later period, however, when the Scottish Parliament, deluded by the hypocritical professions of Charles II., took up arms in his cause, Leslie was appointed commander-in-chief, and pursued a system of tactics which had well nigh proved fatal to Cromwell, when the ignorant impatience of the church and state committee ruined everything by precipitating a battle. The result was the defeat at Dunbar on the 3d of September, 1650. He afterwards retreated to Stirling, where he was joined by Charles, who assumed the command of the army, which ultimately retreated to Worcester, where it was routed by Cromwell, on 3d September, 1651. Leslie, endeavouring to return to Scotland, was apprehended in Yorkshire and committed to the Tower, where he was imprisoned till the Restoration in 1660. The following year he was rewarded for his services and sufferings in the royal cause with the title of Lord Newark, and a pension of £500. He died in 1682.

LESLIE, John, Bishop of Ross, an able Scottish prelate and diplomatist, born in 1526 or 1527, studied successively at Aberdeen, Toulouse, Poitiers, and Paris. His origin is not known. Knox accused him of being the son of a priest. According to others he descended from the Leslies of Balquain, Aberdeenshire. He was charged to escort Queen Mary from France in 1561, and was her most active advocate in the Commission of Ross. He was afterwards imprisoned for his intrigues on her behalf, and being liberated in 1573 he went to France. In 1579 he was made suffragan to the Archbishop of Rouen, and in 1593 Bishop of Constance. Ultimately he retired to a monastery near Brussels, where he died 31st May, 1596. He left, among other works, a Latin one entitled De Origine, Moribus, et Rebus gestis Scotorum (Romæ, 1578, 4to); and one in the Scottish dialect, The History of Scotland from the Death of James I. in 1436, to the Year 1561, left behind him in MS., and first printed by the Bannatyne Club in 1830.

LESLIE, Sir John, physicist and mathematician, was born at the kirk-town of Largo, in Fife, on the 16th of April, 1766, where his father, Robert Leslie, was a joiner and cabinet-maker. Being of feeble health he was obliged to leave school at an early age, but received at home some lessons in mathematics from his elder brother Alexander, and his proficiency in geometrical exercises, under the unfavourable circumstances in which he was placed, brought him at an early period under the notice of Professors Robinson and Stewart, of the University of Edinburgh. He was sent to the University of St. Andrews in 1779, where he studied six sessions, being the usual routine of students intended for the church, and then removed to Edinburgh, where he studied three years, during which time he was introduced to Dr. Adam Smith, and employed by him in assisting the studies of his nephew, afterwards Lord Reston. In 1788 he went to Virginia as tutor to two college friends; and after spending more than a year in America, returned to Edinburgh. In January, 1790, he proceeded to London, carrying with him some recommendatory letters from Dr. Smith. His first intention was to deliver lectures on natural philosophy; but being disappointed in his views, he commenced writing for periodical works, and undertook to translate Buffon's Natural History of Birds for John Murray. His translation was published in 1793 in nine octavo volumes. During the progress of the translation he fulfilled an engagement with the Messrs.

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Wedgewood of Etruria in Staffordshire, to superintend their studies; he left them in 1792. In 1794 he spent a short time in Holland; and in 1796 he made the tour of Germany and Switzerland with Thomas Wedgewood. About this period he stood candidate for a chair at St. Andrews, and subsequently for that of natural philosophy at Glasgow, but without success. He invented the Differential Thermometer about the year 1800. The results of his inquiries into the nature and laws of heat, in which he was so much aided by this exquisite instrument, were published to the world in 1804 in his celebrated Essay on the Nature and Propagation of Heat. The work was honoured by the council of the Royal Society with the Rumford Medal. In 1805, on the translation of Professor Playfair from the chair of mathematics to that of natural philosophy in the University of Edinburgh, Leslie, after a keen contest, inspired by religious prejudices, was elected to succeed him in the former. This controversy elicited Dr. Thomas Brown's work on Cause and Effect. Through the assistance of one of his ingenious contrivances, his hygrometer, he arrived in 1810 at the discovery of that singularly beautiful process of artificial congelation, which enabled him to freeze water and mercury. In 1809 he published his Elements of Geometry, which immediately became a class-book, and has since gone through many editions. He also published, in 1813, an Account of Experiments and Instruments depending on the Relation of Air to Heat and Moisture. In 1817 he produced his Philosophy of Arithmetic, exhibiting a Progressive View of the Theory and Progress of Calculation; and in 1821 his Geometrical Analysis and Geometry of Curve Lines, being volume second of a Course of Mathematics, and designed as an Introduction to the Study of Natural Philosophy. In 1822 he published Elements of Natural Philosophy for the use of his class—reprinted in 1829—and of which only one volume appeared. Rudiments of Geometry, a small octavo, published 1823, and designed for popular use, was his last separate work. Besides these separate works he wrote many articles in the Edinburgh Review, three treatises in Nicholson's Philosophical Journal, a few in the Transactions of the Royal Society of Edinburgh, and several articles on different branches of physics in the Supplement to the Encyclopædia Britannica. In 1819, on the death of Professor Playfair, he was appointed to the professorship of natural philosophy. Among the preliminary treatises of the seventh edition of the Encyclopædia Britannica, which began to be published in 1830, he wrote a Discourse on the History of Mathematical and Physical Science during the Eighteenth Century. Early in the year 1832, at the recommendation of the lord-chancellor (Brougham), he was invested with a knighthood of the Guelphic order at the same time that Herschel, C. Bell, Ivory, Brewster, South, and Harris Nicolas, received that distinction. He died at his seat at Coates, from an illness brought on by incautious exposure, November 3, 1832.

L'ESPINASSE, Julie-Jeanne-Eléonore de, a celebrated Frenchwoman, born at Lyons in 1732, the illegitimate daughter of Madame D'Albon. On the death of her mother, who left her a small annuity, she went to live with the Marquise De Vichy, the legitimate daughter of Madame D'Albon, and in 1754 she became the companion of Madame Du Deffant (who had already become blind), at the urgent request of the latter. This position she occupied for about ten years; but the jealousy and selfishness of Madame Du Deffant rendered her situation very uncomfortable and harassing. She gained the friendship of all the *élite* of Madame Du Deffant's society, such as Marmontel, D'Alembert, and Turgot; and when the separation between the two ladies at last occurred her friends all adhered to her. D'Alembert especially signalized himself by his assiduous and long-continued devotion to her. Her affections were first given to Count De Moura, son of the Spanish ambassador, a young man ten years her junior; but being unsuccessful, she soon formed another attachment, still more ardent, to the Count De Guibert. Her second love was no more propitious than the first; and, with the hope of rescuing herself from this fatal passion, she occupied herself in bringing about the marriage of her lover, and tried to interest herself in his wife. But this plan proved unavailing, and misery on account of her unrequited affection hastened her death, which took place in 1776. She left D'Alembert her executor, and recommending to him with great earnestness her correspondence with M. De Guibert. Her letters were published by Mme. De Guibert after the death of her husband—Lettres de Mlle. De l'Espinasse, two vols. 8vo, 1809. These letters, it is said, depict passion in stronger and more vivid colours than the Nouvelle Héloise of Rousseau.

LESSING, Gotthold Ephraim, a distinguished German author and reformer of the national literature, was born January 22, 1729, at Kamentz, a town in Upper Lusatia. His father, a Lutheran clergyman, gave him his first religious instruction. In 1741 Lessing was sent to the school at Meissen, where he received gratuitous instruction, and studied Greek, Latin, and mathematics with great success. In 1746 he entered the University of Leipzig with a view to study theology, but his love of the drama and his intimacy with Schlegel, Mylius, Weisse, and other young men of literary tastes, led him to abandon this intention. He also became acquainted with some players and a stage-directress named Neuber, through whom some of his earliest pieces were placed on the boards. After a short stay in Wittenberg he went, in 1748, with Mylius to Berlin, where he wrote for magazines and booksellers. He also undertook, with Mylius, in 1750, a publication entitled Beiträge zur Historie und Aufnahme des Theaters, and published some poems under the title of Kleinigkeiten. At the same time he studied the English and Spanish poets, and translated a work of the Spanish philosopher Huarte. In 1752 he went to Wittenberg, where he became Master of Arts, returned to Berlin the same year, and wrote some articles in Voss's Gazette. He entered at this time into friendly relations with Moses Mendelssohn and the bookseller Nicolai. In 1755 he wrote his tragedy Miss Sara Sampson at Potsdam. In the same year he set out on a tour, intending to visit Italy; but in consequence of the Seven Years' war only got as far as Holland. He returned to Leipzig, where he resided till 1758, when he returned to Berlin. Here, with his friends Nicolai and Mendelssohn, he established the critical journal, Briefe die neueste Literatur betreffend. He also wrote his Fabeln, and began, under the name of Virginia, the drama which in 1772 he completed as Emilie Galotti. In 1760 Lessing became a member of the Royal Academy of Sciences at Berlin, and soon after became secretary to General Tauenzien in Breslau, which he resigned five years later, and, returning to Berlin, published Laocoon oder über die Grenzen der Malerei und Poesie, and his most perfect drama, Minna von Barnhelm. About 1767 he became director of the National Theatre at Hamburg. While here he wrote his Dramaturgie. His uncompromising criticisms raised him up enemies, and he found himself compelled to quit Hamburg. The Duke of Brunswick called him to Wolfenbüttel, and gave him a privilege exempting his works from censure. But this was withdrawn in consequence of his subsequent disputes with the theologians. In 1775 he went to Vienna,

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having received an invitation to that city, and accompanied Prince Leopold of Brunswick to Italy, which he had long desired to see. He left Germany in April, but returned the same year; and the theological disputes in which he was involved now became more acrimonious. His drama of Nathan der Weise, one of his master-pieces, from its supposed irreligious tendency, added to the fierceness of the controversy. He died February 15, 1781. His complete works were published at Berlin (1771, et seq.); another edition (Berlin, 1796, et seq. thirty vols.); to which must be added his Correspondence, in two vols. (Berlin, 1798); a very superior edition appeared at Berlin in 1838–40. Lessing's Thoughts and Opinions, collected and explained from his Writings, by F. Schlegel, appeared at Leipzig (1804, three vols.) His brother, K. G. Lessing, published an account of his life (Berlin, 1793, two vols.) Lessing's great aim as a writer, and particularly as a critic, was to struggle against the servility to French taste which at that time debased German literature and deprived it of originality. In this struggle he was successful; but it involved him sometimes in exaggerations, and exposed him, as well as his theological quarrels, to asperities which a less energetic writer would have avoided. He occupied himself in turn with philosophy, antiquities, and the drama. See Lessing: His Life and Writings, by James Sime, M.A., London, two vols., 1877, and Gotthold Ephraim Lessing: His Life and Works, by Helen Zimmern, London, 1878.

LESSONS, or LECTIONS, are the portions of Scripture read in church for the instruction of the worshippers. The practice of reading portions of Scripture or other writings designed for instruction or edification in church has prevailed from the earliest times and is still practised by nearly all sections of Christians, but it is only among those bodies which regulate their worship by a liturgy that the lessons are appointed in a systematic order. The lessons then form a portion of the liturgy, and are arranged upon a particular plan to embrace a certain course of instruction. In the Roman Catholic missals the lessons consist of a Gospel and an epistle, most commonly taken from the Gospels and epistles of the New Testament, but sometimes from the Old Testament or the Apocrypha. In high mass they are chanted, the Gospel by the deacon, the epistle by the sub-deacon; in low mass both are read by the priest. The Gospels and epistles are also read or sung in the Church of England. The lessons of the Roman Breviary include homilies from the fathers and lives of saints, as well as copious extracts from Scripture. In the Greek Church the gospel lessons were taken from the evangelists, the other lessons from other parts of the Old and New Testaments. The number of lessons read both in the Eastern and Western Church has varied at different times and on different occasions. A practice early prevailed of following the lessons by responses or short anthems sung after each. In the Church of England service the lessons have been enlarged, so that with certain exceptions the Old Testament, including a part of the Apocrypha, may be read through once, and the New Testament three times, at morning and evening prayer, in the course of a year. The term lesson is applied only to these enlarged readings, two of which are appointed for each day at morning and two at evening prayer, according to an order contained in the calendar. Proper or special lessons are appointed for Sundays and holidays. Each lesson is followed by a psalm or anthem.

LESTRANGE, SIR ROGER, a political partisan and controversialist, was the youngest son of Sir Hammond Lestrange, knight of Hunstanton Hall, Norfolk, where he was born in 1616. His father, being a zealous royalist, brought up his son in the same principles. In 1629 he attended Charles I. in his expedition into Scotland. In 1644 he formed a plan for surprising Lynn, but being detected with the king's commission in his pocket he was tried by a court-martial as a spy and condemned. He was, however, respited from time to time until he had lain in prison four years, when, by the connivance of his jailer, he made his escape to the Continent. In 1653 he returned to England. On the Restoration he was made licenser of the press, a post which he continued to hold until the close of the reign of James II. In 1663 he set up the Public Intelligencer, which he discontinued with the design, then concerted, of publishing a London Gazette, the first number of which appeared February 4, 1665. In 1679 he set up a paper called the Observator in defence of the measures of the court. In 1687 he was obliged to give up the Observator because he could not agree with James, who had knighted him, in the doctrine of toleration, although he had written in favour of the dispensing power. He died in 1704. He was the author of a great number of political tracts full of coarse and virulent abuse. He translated Josephus, Cicero's Offices, Seneca's Morals, Quevedo's Visions, &c.

LESTRIS, a genus of the Larinæ or Gulls, popularly known as the 'skua gull,' and which includes three distinct species. The bill is of a hooked shape, and the claws are strong and curved. The body-colour is a sooty-brown or sombre tint. These birds inhabit the northern Scottish islands, and extend into the polar circle. They have the peculiar habit of following other species of gulls, and of compelling them to disgorge their prey, which is then seized and eaten by the skuas. In stormy weather these gulls are found inland, the smaller forms then living upon worms, &c. The name Lestris is derived from the Greek word *lestris*, meaning a robber or pirate, and is applied to the skuas in allusion to their predatory habits. (Pl. CLII.–CLIII. fig. 17.)

LESUEUR, EUSTACHE, one of the most distinguished French painters, born at Paris in 1617, was instructed in drawing by his father, a statuary, and was afterwards placed at the school of Simon Vouet, and married in 1644 the sister of one of his comrades. He was thus compelled for a living to make vignettes and frontispieces for books, which are now much sought after. His first works, which are in the style of his master, are quite distinct from his subsequent ones. His great work was the series of paintings which he executed for the Carthusian monastery in Paris in 1645–48. In twenty-two pictures he delineated the principal scenes in the life of St. Bruno, the founder of the order. This series is now in the museum of the Louvre. Lithographic sketches of it were published at Paris in 1822 and 1823. In 1650 he painted for the corporation of goldsmiths the Preaching of the Apostle Paul at Ephesus. This painting was presented to the church of Notre-Dame, and was exhibited annually on the first of May. His next works were a Magdalen and a St. Lawrence, and in 1651 two scenes from the life of St. Martin, &c. Among the most distinguished of his later works are some mythological scenes in the Hotel Lambert relating to Cupid and the Muses with Apollo. He died 30th April, 1655.

LESUEUR, JEAN FRANÇOIS, a musical composer, a descendant of the great painter Lesueur, born at the village of Plessiel, near Abbeville, in 1760. The passing of a military band having evoked his musical enthusiasm at the age of six he was placed at the musical school of the cathedral of Amiens, and after completing his musical studies was made director of music in the cathedrals at Seez, Dijon, &c., and in 1784 in the church of the Innocents at Paris. In 1786, in opposition to several candidates, he received

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the place of master in the cathedral of Paris, and his elevated and impressive compositions, no less than the excellent manner in which he led the orchestra, made him a universal favourite. His own inclinations and the advice of Sacchini induced him to compose for the theatre. Telemachus was his first opera, which was brought forward with great success in the Théâtre Feydeau. In 1788 Lesueur resigned his place at Notre-Dame that he might devote his time to theatrical music, and lived till 1792 with his friend and patron Bochard de Champagny, in whose house he applied himself so laboriously that his host, anxious for his health, would not allow him lights for more than half the night. Lesueur was at that time engaged in writing his opera La Caverne, produced at the Théâtre Feydeau in 1792: one night his light went out, and unable to endure any interruption, he lay on the floor before the fire, and continued to write by the feeble light afforded by a few pieces of wood until he was found in that situation the next morning by Champagny. His Paul et Virginie was represented in 1794; Telemaque, 1796; Les Bardes, 1804; La Mort d'Adam in 1809. On the representation of his Bardes Napoleon sent him by General Duroc the brevet of chevalier of the Legion of Honour, with the inscription, 'L'empereur des Français à l'auteur des Bardes.' On Chénier's proposition he was made professor of music in the National Institute, and wrote several pieces of music for festivals during the time of the republic; was afterwards displaced by intrigue, but again restored by Bonaparte. From 1806 to 1824 he was a member of the musical jury of the opera. In 1813 he became a member of the fourth class of the Institute; in 1814 composer to the king; and in 1817 professor of composition to the Conservatoire. His sacred music consists of thirty-three masses, oratorios, and motets. In 1795 he became a member of the committee of instruction of the Conservatoire, and along with Méhul, Langlé, Gossée, and Catel, assisted in compiling the Principes élémentaires de Musique and the Solféges of this society, published in 1816. He died in 1837. He also wrote Essai sur la Musique sacrée (1787), and Lettres et Réponse à Gaillard, sur l'Opéra de la Mort d'Adam, et sur plusieurs Points d'Utilité relatifs aux Arts et aux Lettres (1801).

LETHARGY (Greek, *lethargos*, from *lēthē*, forgetfulness), an unnatural tendency to sleep, closely connected with languor and debility, and much resembling apoplexy in character. When awakened the person answers, but, ignorant or forgetful of what he said, immediately sinks into the same state of sleep. It may arise from a plethoric habit, from deficient circulation in the brain, or from nervous exhaustion of that organ. A poisoned state of the blood, or a suppression of urine, may induce the lethargic state. When it is the consequence of alcoholic intoxication, or of the action of narcotic drugs, it should be treated as apoplexy.

LETHE (Greek, *Lēthē*, forgetfulness), the River of Oblivion, one of the streams of the lower regions celebrated in ancient mythology, whose water had the power of making those who drank of it forget the whole of their former existence. Souls before passing into the Elysian fields drank of its water that they might have no recollection of their earthly sorrows; and also those in particular who were destined to return to the upper world in new bodies, that they might forget the pleasures enjoyed in Elysium.

LETO. See LATONA.

LETTER OF ATTORNEY. See ATTORNEY.

LETTER OF CREDIT, a letter written by one merchant, bank, or correspondent to another, authorizing him to credit a third person with a certain sum of money. To prevent the letter from falling into improper hands as many details of the payee should be given as possible.

LETTER OF MARQUE, a commission granted to the commander of a merchant ship or privateer to cruise against and make prizes of the enemy's ships and vessels, either at sea or in their harbours, under pretence of making reprisals for injuries received. The ship so commissioned is also called a *letter of marque* or *mart*. These letters are grantable by the law of nations, but the sovereign power must be called in to determine when reprisals may be made. The plenipotentiaries of Great Britain, Austria, France, Prussia, Russia, Sardinia, and Turkey signed a declaration on the 16th of April, 1856, to the effect that privateering is and remains abolished. Those powers who had not acceded, or should not accede to it, were not to be bound by the declaration.

LETTERS. See ALPHABET, CONSONANT, VOWEL, WRITING, &c.

LETTERS-PATENT, or LETTERS-OVERT, as defined by 7 William IV. and 1 Victoria, cap. lxxiii., are letters of the sovereign, open, but sealed below with the Great Seal of England, conferring on a person or a public company the privilege of doing or exercising what he or it could neither perform nor do without this authority. They derive their appellation from the circumstance that they are open, having the seal affixed and ready to be exhibited in confirmation of the authority which they give. Letters-patent are issued to make aliens denizens and to protect new inventions, and from the latter procedure is derived what is called the incorporeal chattel of patent-right. Now no mere monopoly can be secured by such letters, though it was otherwise in the time of Queen Elizabeth and in several preceding reigns. The crown often grants a patent-right to the inventor of a new process in manufactures for a limited period, that he may have an opportunity of being rewarded for his discovery, or of securing compensation for the labour and expense which he may have been put to in perfecting an invention. The legal rights of patentees, and the mode in which patents may be secured and enjoyed, will be explained under the head of PATENTS. The founders of schools and of charitable endowments have frequently had letters-patent granted to them, by which they were empowered to draw up rules and ordinances for the government of their charity, and for constituting a corporation for that purpose for all time coming. A patent-right granted in England does not extend to Ireland.

LETTUCE (*Lactuca sativa*), a smooth, herbaceous, annual plant, containing a milky juice, which has been cultivated from remote antiquity, and is in general use as a salad. The original locality is unknown. The stem grows to the height of about 2 feet, and bears small pale-yellow flowers; the inferior leaves are sessile, and undulate on the margin. The young plant only is eaten, as it is narcotic and poisonous when in flower. Twenty species of *Lactuca* are known from various parts of the globe. The inspissated juice, known as lettuce-opium, is used medicinally to allay pain and induce sleep.

LEUCADIA, or SANTA MAURA, one of the Ionian Islands, on the west coast of Greece, about 18 miles to 20 miles long, and 7½ miles to 10 miles wide. Its surface is extremely mountainous and rugged, particularly towards the centre. The eastern side is waste and barren, but the western and northern parts are very productive, yielding vines, olives, citrons, pomegranates, almonds, and some corn. Honey and wax are also produced, and considerable numbers of sheep and goats are reared. But the staple commodity of the island is bay-salt, of which about 8000 tons are annually exported. Besides agriculture a large portion of the inhabitants are engaged in navigation and

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the fisheries. The celebrated promontory which forms the south-western extremity, anciently called Leucates or Leucate, now Cape Ducato, is also known as the Leucadian Rock, or the Lover's Leap. It is a white cliff rising to the height of at least 2000 feet. On its summit was a temple of Apollo, at the annual festival in whose honour a criminal was thrown from the rock into the sea as a sin-offering, loaded, as it were, with all the sins of the people. Living birds were fastened to him, so that he generally fell gently without much injury into the deep, whence he was taken out, but was obliged to leave the country for ever. Sappho is said to have leaped from this rock to get rid of the tortures of unhappy love, and many despairing lovers, among whom was Artemisia, queen of Halicarnassus, are said to have followed her example. Amaxichi is the chief town. It is situated on the north-eastern part of the island, and has about 5000 inhabitants. Near it is the fortress of Santa Maura. Pop. of the island, 20,737.

LEUCINE ($C_6H_{13}NO_2$). This product of decomposition of albuminous matter was first discovered by Proust in decayed cheese in the year 1818. It was afterwards found in the liver, and it is now known to be very widely distributed in the animal economy, as in the pancreas, in the thymoïd and thyroïd glands, and in various fluids of the body of persons suffering from liver disease, from typhus, and other diseases. It is got artificially by the decomposition of dry albumin, fibrin, casein, horn shavings, wool ligaments, flesh, by putrefaction, by boiling with sulphuric acid, or by boiling or fusing with potash. There are always produced at the same time tyrosine and other products, the separation of which is tedious. Leucine can also be prepared synthetically, and this is a fact of special interest in organic chemistry, seeing that leucine is commonly derived from albumin, one of the most complex and least understood organic compounds. When pure, leucine forms soft white pearly scales, which under the microscope are seen to consist of fine needles grouped together. It is tasteless and inodorous, melts at 338° Fahr., and when heated higher begins to decompose; readily soluble in hot water; sparingly soluble in alcohol. It has a neutral reaction, and combines both with acids and bases. The acid compounds are crystalline, and combine with metals to form double salts. The other compounds contain leucine combined with oxide of lead, of copper, and of mercury. Leucine is readily decomposed by oxidizing agents, by chlorine, and by nitric acid. By nitric oxide gas it is converted into *leucic acid* ($C_6H_{12}O_3$), which forms hard colourless needles, with pearly lustre, sour bitter taste, and strongly acid reaction; it is soluble in water, alcohol, and ether; melts and sublimes below 212° Fahr. It combines with most of the metals, and forms salts which are for the most part crystalline and moderately soluble in water.

LEUCIPPUS, founder of the atomic school in the ancient philosophy, lived 500 years B.C., and is said by some to have been a native of Abdera; by others, of Elis or the Island Melos. His instructor was Zeno the Eleatic, or according to others, Parmenides, and he himself was the teacher of Democritus. With regard to his philosophical system, so far as Leucippus is responsible for it, it is impossible to speak with precision or certainty; but the prevailing opinion is that to settle a contest between reason and sensible experience, which had been mainly excited by the Eleatic school, he invented his system, which he opposed to that of the Eleatics. The more ancient Eleatics denied the reality of motion, vacuity of space, and plurality of matter, reducing all that exists to a single, eternal, and immutable substance. Leucippus, on the contrary, assumed the infinity of space. In this space there are, according to his view, an infinite quantity of particles of matter too minute to be perceptible to the senses. In themselves they are indivisible (thence the name *atoms*); for if an infinite divisibility were ascribed to them they would at last disappear into nothing. Now these atoms move from eternity in infinite space, and by their union and separation form the origin and end of things. Since unity can never become plurality, nor plurality become unity, the atoms cannot by their connection produce a true unity, but mere aggregations. In substance all the atoms are similar, but of an infinite variety of shapes, by which is explained the variety of bodies formed by them. Atoms are moreover distinguished by their local situation and the order in which they are compounded. Situation and order are the fundamental properties of the atoms; from their union and separation arise properties of the second order (*qualitates secundariæ*), such as hardness, softness, colour, sound, smell, &c. As far as can be deduced from the imperfect notices which we have, Leucippus explained the origin of the world by the motion of atoms in the following manner:—From the infinity of atoms some broke loose, and becoming confused, produced a rotatory motion, by means of which similar particles were associated with similar particles, while the dissimilar were repelled. From the necessary inequality of the velocity of the bodies the smaller were driven to the outside, and formed, as it were, an envelope around a kernel. The grosser parts of this envelope sank downwards, and by their mutual collisions attenuated the envelope. The bodies that sank downwards compose the earth; the envelope itself was finally inflamed, and gave rise to the stars. To fire he ascribed round atoms. The atoms composing the other elements—water, air, and earth—were distinguished merely by magnitude. Fire, as the most subtle, the lightest, and most fluid element, he made the soul of the world, the principle of life, sensation, and thought. These last modifications, however, according to Leucippus, were not always founded in the nature of atoms, but merely in the mode of their aggregation. The intellectual substance (consisting of particles of fire) is diffused through the whole body. Men and animals inhale it with the atmosphere, and hence life ceases with the end of respiration. There is nothing said in his system respecting the soul of the universe, a providence, or Deity. An attempt to propound some of the leading doctrines of his system was made by Diogenes Laertius.

LEUCITE is a mineral which occurs in little masses having the appearance of crystals rounded by attrition; also in crystals whose form is that of the trapezohedron, apparently with cleavages parallel to the rhombic dodecahedron and cube, the latter of which, being the most simple of the two, has been adopted as the form of the primary crystal. Colour, grayish white; translucent; lustre vitreous; fracture conchoidal; specific gravity, 2·48. Before the blowpipe alone it is infusible; with borax it fuses into a transparent glass. When finely divided it is completely decomposed by hydrochloric acid. It consists of 54·5–57·8 silica, 22·8–23·5 of alumina, 12·45–20·4 of potash, and variable quantities of soda, lime, and oxide of iron. It is found only in volcanic and trap rocks. The lavas of Vesuvius and basalts of Italy abound with it. It is especially abundant between Rome and Frascati. From its crystalline form and colour this mineral has been called white garnet, but it does not properly belong to the garnet group.

LEUCOLINE (C_9H_7N), a coal-tar base, isomeric with chinoline (which see), and the lowest member of the series to which iridoline (see LEPIDINE) and cryptidine (incorrectly said, vol. ii. p. 659, to be homologous

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with chinoline) belong. The main differences between leucoline and chinoline lie in the former not giving a blue derivative from amyl-leucoline, and in the boiling-point of leucoline being 341° Fahr., that of chinoline being 428° Fahr.

LEUCOTHEA. See INO.

LEUCTRA, a village in Bœotia, on the road from Thespiæ to Platæa, erroneously supposed to be represented by the ruins of Lefka, and famous for the great battle in the year 371 B.C., which the Theban Epaminondas won over the Spartan king Cleombrotus, thus putting an end to the great influence which Sparta had exerted for several centuries over all Greece.

LEUK (French, *Louèche*), a town and parish, Switzerland, in the canton of Valais, on the right bank of the Rhone, 15 miles E.N.E. of Sion. It contains two churches and a large town-house, and several ruins, which give it a very picturesque appearance. A bridge across the Rhone connects Leuk with the road on the Simplon. About 5 miles to the north, on the Dala, are the celebrated thermal baths of Leuk (Leukerbad), 4500 feet above the sea, which annually attract large numbers of visitors, chiefly Swiss and French. They are slightly saline, and have a temperature of 124°. They are used chiefly for cutaneous diseases, and the patients often remain in them as long as eight hours a day. The Ladders (Leiter) are the chief curiosities here. They are placed at a short distance from the baths, along the face of the precipice which incloses the valley, and long formed the only access to the valley of Albinen, which is situated about a mile from the edge of the precipice. These ladders, eight in number, are fixed almost perpendicularly on the cliff, and though often awry and rather unsteady, are climbed or descended at all times of the day and night by all persons, male or female, often with heavy burdens. The situation of Leukerbad is dreary, and the accommodation imperfect. Since the establishment of the baths in 1501 they have been thrice carried away by avalanches. It is said that there was a bathing establishment here in the twelfth century.

LEUTHEN, or LISSA, a village in Lower Saxony, west of Breslau, famous on account of a battle gained here by Frederick the Great, December 5, 1757, over Prince Charles of Lorraine. See SEVEN YEARS' WAR.

LEUWENHOEK, ANTON VAN, a celebrated natural philosopher and microscopist, born at Delft in Holland in 1632. His skill in grinding optical glasses led the way to the making of microscopical observations, which procured him no small degree of fame. He began to publish an account of his discoveries in the English Philosophical Transactions in 1673, and they are continued from No. 94 to No. 380 of that collection. In 1680 he was chosen a fellow of the Royal Society; in 1697 he was elected a correspondent of the Academy of Sciences of Paris; and in 1698 he entertained the Czar Peter the Great, then at Delft, with an exhibition of his experiments. He also presented Queen Mary with two of his microscopes when she visited him once when she was in Holland. He appears to have passed the whole of his life at his native place, devoting his time to microscopical researches, chiefly relating to anatomy. He died in 1723. A Latin translation of his works in the Dutch language was published between 1695 and 1699 (four vols. 4to) under the title of Arcana Naturæ detecta, and reprinted at Leyden in 1722. His industry was great, but preconceived opinions sometimes led him to erroneous conclusions.

LEVAILLANT, FRANÇOIS, a celebrated traveller, born of French parents at Paramaribo, in the Dutch colony of Guiana (Surinam), in 1753, from childhood displayed a passion for the study of natural history, particularly of ornithology. His desire of extending his knowledge by travelling in the most distant lands was increased in Europe; and as Africa appeared an excellent field for exploration, he proceeded to the Cape of Good Hope, whence he advanced into the interior of Africa. The specimens which he collected on this occasion were entirely lost, the ship in which they were embarked for Holland having been attacked by the British, and burned in the course of the action. He soon after made a second expedition, and with a tolerably large caravan directed his course to the countries on the north of the Cape Colony. Insurmountable obstacles prevented him from pursuing his adventurous researches so far into the interior as he wished. The fruits of his labours were, however, important. Levaillant died at Sézanne 22d November, 1824, aged seventy. It has been objected to his accounts that they are not always accurate, and that they are often improbable, though this cannot be satisfactorily shown. However, they were in consequence greatly, and it is almost certain unjustly, discredited. His readers are interested by his lively descriptions, and by an attractive philosophical originality. His accounts of his first and second excursions were published in French in 1789 and 1796. He also left some works on natural history, and some separate treatises. The most important of these works are Histoire naturelle des Oiseaux d'Afrique (1798–1812, in fifty numbers, folio) and the Histoire naturelle des Perroquets (1801–1805, two vols. folio). His narratives of travel were translated into English.

LEVANT (Italian, *il Levante;* French, *le Levant*, the orient or rising, that is, the east). This term is applied in the widest sense to all the regions eastward from Italy as far as the Euphrates and the Nile, and in a more contracted sense to the Asiatic coasts of the Mediterranean and the adjacent countries from Constantinople to Alexandria in Egypt. The most famous of the commercial cities of the Levant, taken in this narrow sense, besides Constantinople and Alexandria, are Smyrna, Scanderoon (Alexandretta), and Aleppo. Smyrna is the principal commercial place of the Levant, and the grand mart of the Asiatic trade. The *Levant coffee*, as it is called, does not grow in the Levant, but in Arabia, and has this name because it is exported from the ports of the Levant.

LEVEE (from the French word *lever*, to rise, and the time of rising) is a word used in high life or court language for the ceremonial visits which great personages receive in the morning, as it were at their rising. The levee is distinguished from the drawing-room, inasmuch as at the levee of a gentleman gentlemen only appear, and at the levee of a lady only ladies, while at the drawing-room ladies and gentlemen both are admitted. The meaning is now more extended, and the term is applied chiefly to the stated occasions on which the king or queen of this country publicly receives those of their subjects whom their rank entitles to the honour. On the first presentation of daughters of dukes, marquises, and earls, it is customary for the Queen of Britain to kiss them on the cheek.

LEVEL, SPIRIT, a glass tube slightly convex on the upper side, nearly filled with alcohol, closed at both ends, and cased in brass or wood, so that it has a plane under surface on which it may rest steadily when laid on a table. As the tube is not quite filled with alcohol it has a bubble of air, which always tends to remain in the highest part. If the instrument is a good one, when laid on a level table the bubble ought to be found in the middle of the visible part of the tube, as in fig. 10, Pl. XCVIII.

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Sometimes, when the bubble is large, the visible part of the tube is graduated. To test if a table is horizontal, see if the bubble is in the middle of the tube when the level is laid in two positions making an angle with each other. Fig. 9 shows a form of spirit-level which has been usefully employed in the physical laboratory: a space whose upper surface is slightly convex is *nearly* filled with alcohol; the level is so constructed that when laid on a horizontal table the bubble is found at the centre of the surface. This instrument is fitted to telescopes, &c., and may be adjusted by means of three levelling screws. It possesses a great advantage over the ordinary spirit level, inasmuch as it has not to be shifted in azimuth.

LEVELLING INSTRUMENTS. *The Water Level.*—The surface of a liquid at rest is level, hence if a long glass tube with both its ends bent upwards be nearly filled with water, the surfaces of the water in the two ends will always be in a horizontal line. Any point seen in the direction of this line is in a horizontal line with the surfaces of the water. When the tube is supported at the middle in such a way that it may be turned about a vertical axis we have the water level in its simplest form. Fig. 8, Pl. XCVIII., shows another form: the ends of the tube have loosely fitting floating pistons, which support wire rectangles with horizontal threads. Lines joining the straight threads are horizontal, and may be used as lines of sight. The tube may be supported by a three-legged stand, like the more common levels mentioned below, and may be used in the same way. —*The Y, Troughton's*, and *Gravatt's Levels*, have telescopes provided with two cross threads (from spiders' webs). When a distant point is looked at it is made to coincide with the intersection of the cross threads, therefore the line joining this intersection with the centre of the object-glass is the *line of sight*. A spirit-level is firmly attached to the telescope, in such a way that when the line of sight is perfectly horizontal the bubble is in the middle of the tube. Firmly attached to the telescope and level is a compass-box, containing a magnetic needle, which is sometimes of use to surveyors. The telescope is supported on a vertical axis, which turns in a journal on a flat brass plate, and terminates in a ball resting in a socket in the centre of a second plate below the first. This second plate is steadily supported on three legs, which rest on the ground. The two plates are connected by means of levelling screws; these screws enable us to have the axis truly vertical no matter how uneven may be the ground on which the instrument rests. The three levels mentioned differ from one another merely in their methods of attaching together the telescope, spirit-level, and compass-box. —A *Levelling Staff* is usually in three pieces, which pack together like the parts of a fishing-rod, and when opened out form a staff 17 feet long; this is divided into feet and hundredths of feet. To obtain the difference of level between two points A and B plant the level at a suitable place between A and B; adjust until the line of sight of the telescope remains horizontal in all azimuths; read off the height at which a levelling staff held upright at A by an attendant is cut by the line of sight; let the staff be held at B, and make a second observation; it is evident that the difference between the two observations is the difference of level between A and B. As a level line is really a curve whose radius is 4000 miles, surveyors have to make corrections when A or B is at any considerable distance from the instrument. The atmosphere refracts rays of light, and causes objects to appear higher than they really are. Surveyors correct their observations for refraction as well as for the curvature of the earth.

LEVEL SURFACE, the surface of a body of water at rest; a surface to which at any place a plumb line is at right angles (see HYDROSTATICS). A horizontal plane coincides with, or rather is tangential to, a level surface.

LEVEN, a river which flows from Loch Lomond, and after a course of about 9 miles through a beautiful level called the Vale of Leven, in which are numerous works for bleaching, dyeing, calico-printing, &c., falls into the Clyde at Dumbarton. Smollett has celebrated it in a well-known little poem. Leven is also the name of a river in Fifeshire which, flowing out of Loch Leven, falls into Largo Bay on the Forth at Leven.

LEVEN, LOCH, a lake of Scotland, about 10 miles in circumference, in the county of Kinross. It contains four islands, on one of which was formerly a priory, and on another stand the remains of the castle of Loch Leven, once a royal residence, which was granted by Robert III. to a Douglas. In this castle Mary Stuart was confined after her separation from Bothwell and her capture by the confederate lords at the battle of Carberry Hill. After several unsuccessful attempts she made her escape by the aid of George Douglas, her keeper's brother, on the 2d May, 1568, shortly before the battle of Langside.

LEVER, one of the mechanical powers (which see), a rod or beam of wood or metal by means of which a small force is enabled to balance or overcome a large one. The lever is supported at some point called the *fulcrum*, and it is movable about this point; the resistance to be overcome (called *the weight*), and the force which overcomes it (called *the power*), are applied at other parts of the lever. In the first plate to the article MECHANICAL POWERS, fig. 1 shows the force applied by a hand (the power) balancing a weight; the fulcrum is between the power and weight. In fig. 4 a small boy balances a large boy, the fulcrum being between them. In fig. 5 a man overcomes the resistance which a barrel offers to being moved; the fulcrum or point of support of the lever is between the power and weight. In fig. 7 the fulcrum is the end of the lever where it touches the ground; the weight is between the fulcrum and the power. In figs. 6 and 8 are other examples. Fig. 9 shows that the human arm is a lever, the elbow is the fulcrum, the power is applied by the muscle between the elbow and the hand, the weight is in the hand. The law which holds in the lever is: the *moment* of the power about the fulcrum is equal to the moment of the weight about the fulcrum. In most cases the power and weight are parallel forces, so that if the distances from the fulcrum to where the power and weight act are called *arms*, the law of the lever becomes:—the power multiplied by its arm is equal to the weight multiplied by its arm. It is evident that when the power has a very large arm, and the weight a very small one, a very small power will overcome a great resistance. In the lever, as in all machines when a small force overcomes a great one, the small force acts through a much greater distance than that through which the great force is overcome, or as is sometimes said, 'What is gained in power is lost in time.' Fig. 3 is a common *steel-yard;* the body to be weighed is placed in the scale, the small weight is made to slide along the bar until it balances the scale; it is evident that the greater the weight in the scale the greater must be the distance of the sliding weight from the fulcrum; the bar is graduated, and the weight of the body may be read off at once. Fig. 2 is the beam of a steam-engine; it is a lever with equal arms, the fulcrum being at the centre; the piston-rod is attached to one end, and overcomes the resistance of machinery applied by means of a con-

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necting-rod at the other end. The beam of an ordinary pair of scales is a lever with equal arms (see balance). Weighing machines (which see) are usually combinations of levers. Scissors, nut-crackers, toys, a poker, an oar, &c., are familiar examples of levers.

LEVER, CHARLES JAMES, a brilliant Irish novelist, was born at Dublin 31st August, 1806, though in biographical dictionaries he is generally represented to have been born two or three years later. He was educated for the medical profession, and took his degree of Bachelor of Arts at Trinity College, Dublin, in 1827, and that of Bachelor of Medicine in 1831. He finally took his doctor's degree at Göttingen, and returned to Ireland to engage in practice. During the prevalence of cholera in 1832 he gained considerable reputation for his skill and devotion in the treatment of that disease. In March, 1834, he contributed his first paper to the newly-started Dublin University Magazine, of which he subsequently became, in 1842, the popular and accomplished editor. The first chapter of Harry Lorrequer, a designation which he afterwards made world-famous as his *nom de plume*, had appeared in the February number for 1837. Meanwhile he was attached as physician to the British legation at Brussels, where he practised for three years. During his editorship of the Dublin University Magazine he resided in the neighbourhood of the Irish capital, attracting to his intimacy and hospitality the brightest, wittiest, and most scholarly men of the locality. He held the post of editor for about three years, and then, in consequence of the irritation incidental to his duties, took up his residence on the Continent, still continuing his literary labours with unwearied industry and increasing reputation. Charles O'Malley, Tom Burke, Jack Hinton, &c., constituted a romantic literature entirely *sui generis*. The rollicking character of these was intensely national, and the extraordinary prominence given in them to horsemanship is to be attributed to the circumstance of Lever's youth being much occupied in horse-breaking. His later novels were more thoughtful and artistic. He obtained a diplomatic post at Florence about 1845, and was appointed vice-consul at Spezzia in 1858, in the gulf of which, along with a youthful daughter, he on one occasion battled for his life for fully an hour. In 1867 he was appointed vice-consul at Trieste, where he died June 1st, 1872.

LEVI, the third son of Jacob and Leah. The prince of the Shechemites having ravished his sister Dinah, he, with his brother Simeon, attacked their city while they were suffering the consequences of circumcision, to which they had submitted, and murdered all the males. Jacob reproaches them with this act of cruelty on his death-bed, and threatens them with the dispersion of their descendants—'I will divide them in Jacob, and scatter them in Israel' (Gen. xlix. 7). In no other fact of his life does Levi stand prominently and distinctly out from his brethren. Three sons went down with him to Egypt—Gershon, Kohath, and Merari (Gen. xlvi. 2). Moses and Aaron were of this tribe.

LEVIATHAN (Hebrew) is compounded of two words meaning a *great fish* and *fastened;* hence it probably means a huge fish covered with close scales. The Septuagint renders it *drakŏn* (a dragon), and *kētos* (a whale). From the description given of it in the book of Job (xli.) it is usually, and probably correctly, considered to mean the crocodile, though in some places it has been interpreted the whale. See Tristram's Natural History of the Bible.

LEVIGATION, the reduction of a hard body to a fine state of division or a paste by rubbing it moistened with water or other fluid upon a flat slab of stone by means of another flat block of stone.

LEVITES is generally employed not to designate the whole tribe that traced its descent from Levi, but a division within the tribe itself, in contradistinction to priests, who are otherwise called the 'sons of Aaron.' This meaning has perpetuated itself. They were the ministers of worship, specially singled out for the service of the sanctuary. Together with the priests they formed the sacerdotal tribe, though even as late as the time of Aaron there is no distinct trace of a caste-character, nor of an intention to establish a hereditary priesthood. The first step toward this seems to have been taken during the first seclusion of Moses on Sinai. After the sin of the golden calf the Levites were the first to rally round Moses, and then the idea of a special consecration of 'an Israel within an Israel' developed itself, and the Levites thenceforth occupied a distinct position. To assist in preventing the people from their long-continued tendency to lapse into idolatry, the Levites were to take the place of the earlier priesthood of the first-born males, and a census showed the almost exact correspondence of their respective numbers. They now formed the guardians of the tabernacle, and for others to approach it was to incur the penalty of death. They were to occupy an intermediate position between the whole nation, as a priestly people, and the high-priest, who alone might enter 'within the veil.' From the first the Kohathites, as nearest of kin to the priests, had the highest offices assigned them. They bore the vessels of the sanctuary and the ark itself. Their consecration was symbolical of the greatest purity, and they were then given by the people to Jehovah, and again by Jehovah to Aaron and his sons. A permanent organization was made for their maintenance. In place of territorial possessions they were to receive from the others the tithes of the produce of the land, and in their turn to offer a tithe to the priests. When the tabernacle should have a permanent place the whole tribe was to be assigned forty-eight cities, six of which were to be cities of refuge. To the Levites was to belong the office of preserving, transcribing, and interpreting the law, and they were to read it every seventh year at the feast of tabernacles. They were not included in the general census of the people, but in a separate census (1 Chron. xxiii. 3); their number is given at 38,000. Their position was much changed by the revolt of the ten tribes, and after the captivity their numbers had diminished to such a degree that in the movement under Ezra not more than thirty-eight could be brought together. The purity of their blood was stringently guarded both by Ezra and Nehemiah. They almost disappear from the New Testament, and when mentioned at all appear as the types of a formal, heartless worship. After the destruction of the temple they disappear from history, being merged in the crowd of captives scattered over the Roman world. Many separate books of the Old Testament were penned by members of the tribe, and to them in great measure may be ascribed the preservation of the whole. That they should have dropped so completely out of the page of history is not to be wondered at. They had done their work in a localized and exclusive religion, and there was no place for them under the new dispensation.

LEVITICUS, the name of the third book of the Pentateuch, so called from the first word of its contents. By the later Jews it was called the 'Law of the Priests,' and sometimes the 'Law of Offerings.' It consists of seven principal sections, but it may be generally described as containing the laws and ordinances relating to Levites, priests, and sacrifices. The history of the Israelites is not prosecuted in it, and only such events are recorded as bear upon the

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special object of the book. The completion of the tabernacle is narrated in the book of Exodus, and the legislation contained in Leviticus, which is the natural continuation of Exodus, issues from the Divine Glory which rested on the tabernacle in the shape of a cloud. The regulations respecting the sacrifices are classed in three groups, each consisting of a decalogue of directions; and though there is not a strictly systematic order pursued, the presence of a certain plan is always felt. The integrity of the book is very generally admitted, the Elohist, or author of the original document, being credited with having written nearly the whole of it. Knobel points out several passages which he supposes to be of Jehovistic origin. These are chapter x. 16–20, the group of laws in chapters xvii.–xx., the additional enactments about the Sabbath and the feasts of weeks and of tabernacles, the punishments for blasphemy and murder, the directions about the Sabbatical year, and the promises and warnings in chapter xxvi. But competent critics affirm that even passages that have a Jehovistic colouring must have been originally Elohistic.

LEWES, a municipal and parliamentary borough, England, in the county of Sussex, on the bank of the Ouse, here crossed by a bridge, and on the South Coast Railway, 7 miles north-east by east of Brighton. It is built on an acclivity and is a place of great antiquity, containing the ruins of many ecclesiastical buildings. The principal modern edifices are, seven parish churches, various Dissenting chapels, a county hall, a town hall, civil and naval prisons; a corn and hop exchange; school of science and art, a grammar-school, handsome memorial library, &c. The chief manufacture is agricultural implements, and there is a considerable trade in corn, malt, lime, and coals. Lewes sends one member to the House of Commons. In its vicinity, in 1264, the barons, under Simon de Montfort, signally defeated the royal army under Henry III. Pop. (1881), 11,199.

LEWIS, the largest of the Hebrides, separated from the mainland of Scotland by a sea 30 to 35 miles wide, called the Minch. The north-east extremity of the island is named the Butt of Lewis. The south portion is called Harris, and is connected with the former by a narrow neck of land. These two divisions are in two different counties—Lewis being in Ross-shire and Harris in Inverness-shire. The entire length of the island, south-west to north-east, is 52 miles; breadth, varying from 30 miles to 5 and 10 miles; area, nearly 700,000 acres. It is of irregular form, and is deeply indented all round by bays and inlets. Several small islands are dispersed along its coast, the principal of which are Scalpa, on the south-east shore; and Pabay, Taransay, Scarp, and Bernera, on the west coast. The island is in general flat, but contains some considerable elevations, two of which rise each to 2700 feet above sea-level. Numerous beautiful slopes and valleys also occur. In the interior the appearance of the country is peculiarly bleak and desolate, especially in the after part of the year, when the brown bent which grows on its boggy surface becomes decayed. The rivers have all short courses, flowing directly to the coast on either side. Small lakes are thickly dispersed over the whole island; and both they and the rivers abound with fish, including salmon and sea-trout; the whole coast is, besides, very favourable for the white and herring fisheries. The bulk of the soil is deep peat-moss, but the cultivated parts have a soil composed of the debris of the granite rocks, in all conditions and mixtures of gravel, clay, and sand. Up to 1844, when the greater part of the land changed proprietors, agriculture, as well as other industries was in a very backward condition, but sweeping improvments have since greatly changed its character, draining, planting, the reforming of husbandry, roadmaking, the improvement of live stock, the encouragement of fisheries, and the introduction of manufactures, chiefly in the Stornoway district, have greatly increased the prosperity of the island. The Gaelic language is almost universally spoken, and the people are social, kindly, and intelligent. The principal town on the island is Stornoway. Pop. of entire island in 1871, 25,947; in 1881, 28,339.

LEWIS, Right Hon. Sir George Cornewall, Bart., an English statesman and historian, was born in Radnorshire, October, 1806. His father, Sir Thomas Frankland Lewis, who had long been a member of Parliament, and had filled several public offices with credit, was rewarded with a baronetcy in 1846. Sir George Cornewall Lewis was educated respectively at Eton and Christ Church, Oxford, which he entered in 1824. In 1828 he took his bachelor's degree, being first-class in classics and second-class in mathematics. Though called to the bar at the Middle Temple he never practised. In several subordinate appointments he had shown great capacity for business, and succeeded his father as poor-law commissioner in 1839, holding that office till 1847, when he became secretary to the board of control. He was then M.P. for Herefordshire and having connected himself by marriage to several of the leading Whig families, and having thus a certain hope of rapid promotion, he determined to devote himself to politics. He sat for Hertfordshire till 1852. In February, 1855, he succeeded his father in the representation of Radnorshire, and was immediately appointed chancellor of the exchequer by Lord Palmerston. In June, 1859, he became secretary of state for the home department, and secretary of state for war in 1861. He died in Herefordshire, 13th April, 1863. It is chiefly for his writings that he will be remembered. These never, indeed, acquired great popularity, being too dry, abstruse, and solid for those who read merely for amusement; but they won the respect, even when they failed to conquer the convictions, of scholars and authors. From 1852 to 1855 he was the editor of the Edinburgh Review. His first literary effort was his translation, in conjunction with Right Hon. Henry Tufnel, M.P., of Müller's History and Antiquities of the Doric Race (1830, two vols. 8vo). Of his other numerous works the two most likely to influence opinion are his Inquiry into the Credibility of Early Roman History (1855), and Astronomy of the Ancients (1861). The philosophical principle on which he composed his original historical works was, 'the eliciting of historic truth out of mythical narratives.' In following out the critical principles of Niebuhr he was more rigorous and sceptical than that historian, and lays down the rule that where the alloy of error is large, it is better to reject all than to believe all. His essay on the Romance languages is also a well known book.

LEWIS, Matthew Gregory, an English writer, whose attempts, both in the departments of the drama and of romance, obtained at one period a very considerable share of popularity, though but too frequently disfigured by bad taste and degraded by licentiousness, was the son of a gentleman of good property, who was under-secretary at war. He was born in London, 9th July, 1775, and educated at Westminster, on quitting which he travelled for improvement, especially into Germany, the literature of which country produced a strong impression upon him, and gave that peculiar turn to his compositions which placed him in the foremost rank among the delineators of the marvellous and terrific, and has since loaded the shelves of circulating libraries with

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hosts of imitators, most of whom exhibit all the extravagances without the genius of their model. Of his writings the first and most celebrated was The Monk, a romance in three vols. 12mo, 1794, which, although much decried for its licentiousness, ran through a great number of editions; Feudal Tyrants, ditto, four vols.; Romantic Tales, four vols.; Tales of Wonder, in verse, one vol. 8vo; Tales of Terror, one vol. 8vo; the Castle Spectre, a romantic drama, 1798; Adelmorn the Outlaw, 1800; Alphonso, King of Castile, 1801; a volume of miscellaneous poetry; and the Bravo of Venice (a translation from the German), one vol. 8vo. In 1817 his drama of Timour the Tartar was put on the stage. It had much influence in creating the taste for gorgeous pageants, which still interferes with the success of the legitimate drama on the British stage. Mr. Lewis had a seat in Parliament, but seldom took part in the business of the house. His death took place 14th May, 1818, at sea, while on the voyage home from a visit to his West Indian possessions.

LEWIS RIVER OR SNAKE RIVER, a river of North America, which rises in the Rocky Mountains, and runs north-west into the Columbia, 413 miles from its mouth; length, about 900 miles. Its course lies partly in Idaho, partly between Idaho and Oregon, and partly in Washington.

LEWISTOWN, a city of Maine, United States of America, in Androscoggin county, and on the Androscoggin River, which is here crossed by a bridge, and has a fall of 50 feet over a broken ledge. The water power is carefully utilized, being distributed by a dam and canal to several manufactories (chiefly of cotton and woollen goods) and extensive sawmills. It has a fine city-hall, a public library, and a number of churches and educational establishments, and supports several newspapers. Pop. (1880), 19,083.

LEXINGTON, a city of the United States, in Kentucky, 23 miles E.S.E. of Frankfort. It is regularly laid out; has a courthouse, jail, masonic hall, lunatic asylum, the state university, the state agricultural college, two academies, and numerous schools. It is the oldest town in the state (having been founded in 1775), and was once the capital, and though it has several flour mills, tanneries, rope-works, carriage factories, machine shops, and other manufacturing establishments, it is more a place of fashionable residence than of trade. It figured in the civil war between the Northern and Southern States. It has a beautiful burying-ground, in which there has been erected a handsome monument to Henry Clay. Pop. (1880), 16,656.

LEXINGTON, a small town in Massachusetts, is remarkable in the history of the American Revolution as the place where the first British blood was shed in armed resistance to the mother country. On the evening of April 18, 1775, a detachment of British troops was sent from Boston by General Gage, for the purpose of seizing some provincial stores at Concord. Notice of this movement having been communicated to the inhabitants on the route, the militia of Lexington, about seventy men in number, were hastily drawn up on the common by which the road to Concord passes. The British commander, Colonel Smith, having commanded them to disperse without effect, ordered his men to fire. Seven Americans were killed and three wounded, and the company dispersed, several of the militia discharging their muskets as they retreated. A simple monument of granite, bearing the names of those who fell, was erected at Lexington by the commonwealth of Massachusetts, in 1799. Pop. (1880), 2460.

LEY, or LEES, a term usually applied to any alkaline solution made by exhausting ashes that contain an alkali. Soap lees is an alkali used by soap-boilers, or potash or soda in solution, and made caustic by lime. Soap-boilers sometimes make their own lees, but caustic soda, either solid or in solution, can be easily purchased from the manufacturer. Lees of wine are the refuse or sediment deposited from wine standing quiet.

LEYDEN, or LEIJDEN (Latin, *Lugdunum Batavorum;* French, *Leyde*), one of the most important towns in Holland. It lies in the province of South Holland, 22 miles south-west of Amsterdam, on the railway thence to Rotterdam, on both sides of the Old Rhine, and is intersected besides by the Does, Mare, Vliet, and Zyl. Leyden is encompassed by wind-mills, and surrounded by country-seats, pleasure-grounds, gardens, and fertile meadows. The streets of the town are straight, broad, and kept exceedingly clean; that one named Broad Street (*Breede-straat*) is esteemed one of the finest in Europe, being compared to the High Street in Oxford. In it is situated the town-hall (*Stadhuis*), originally founded about 1415. It is a picturesque old building, with its prominent parts gilt, thirty windows in a line in front, a tall spire, and three highly-ornamented projecting gables. In the council-chamber are the painting of the Last Judgment, by Lucas van Leyden, and several good historical portraits; and in part of the lower floor is situated the flesh market. None of the churches are very remarkable buildings, but in the Reformed church of St. Peter are monuments to Boerhave, Spanheim, Scaliger, &c. The most important educational institution is the university, formerly one of the most famed in Europe, and still in excellent repute. Its buildings possess no remarkable architectural features. It is attended on the average by about 700 students, nearly one-half studying law. Connected with the university are a well laid out botanic garden, an observatory, a library, with numerous manuscripts, an anatomical theatre and museum of comparative anatomy, one of the richest collections of natural history in existence, cabinet of coins, museum of antiquities, and a rich Japanese museum. Leyden was at one time greatly famed for its cloth manufactures, which reached their greatest extent in 1670; they subsequently fell off greatly, but have revived in recent years, though not to their former extent. There are also various other branches of manufacture, and the former great trade in books, carried on in the latter part of the seventeenth and during the greater part of the eighteenth century, and rendered world-renowned by the Elzevirs, is represented by several printing-offices.

The most memorable event in the history of Leyden is the siege it sustained from the Spaniards in 1573–74, when Pieter Adriaanzoon van der Werff was burgomaster. By his resolution and heroic example the inhabitants were enabled to stand out nearly four months, though almost reduced by famine. To relieve the town the Prince of Orange at last broke down the dikes, and a favouring wind accompanying, the waters came over the land so rapidly that above 1000 of the besiegers were drowned. The same wind wafted a fleet of 200 boats from Rotterdam to the gates of Leyden, and relieved the place. Leyden is the birth-place of many eminent and remarkable men, among whom may be specified John of Leyden, the founder of the Anabaptists; Camper, Muschenbroek, the brothers Gerard and Isaac Vossius, Gronovius, Luke of Leyden, the brothers Van der Velde, Gerard Douw, &c. The population of Leyden, at one time 90,000, was in 1881, 41,631.

LEYDEN, JAN OF JOHN OF. See article ANABAPTISTS.

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LEYDEN, JOHN, a poet, antiquary, and orientalist, was born at Denholm, in Roxburghshire, Scotland, 8th September, 1775, of parents in humble circumstances. In his earliest youth he displayed the greatest eagerness for the acquisition of knowledge, but enjoyed few opportunities of gratifying it. His predominant desire for learning, however, determined his parents to prepare him for the church, and he entered the University of Edinburgh in 1790. Being an ardent and enthusiastic student, besides attending to theology and the learned languages he acquired French, Spanish, Italian, German, the ancient Icelandic, Arabic, and Persian. After remaining five or six years in Edinburgh, where his varied gifts and acquirements had attracted the notice of some of its most distinguished literati, he accompanied two young gentlemen to St. Andrews as their private tutor, and in 1799 published his History of African Discoveries, which was afterwards continued and enlarged by Hugh Murray (three vols. 8vo, 1818). At this time he also contributed many translations from the northern and oriental languages, as well as original poems, to the Edinburgh Magazine, which were instrumental in introducing him into the best society in the Scottish capital. In 1800 he began to preach, and although popular as a pulpit orator he was not satisfied with his own discourses. He contributed to Lewis' Tales of Wonder, and assisted Sir Walter Scott in procuring materials and illustrations for his Minstrelsy of the Scottish Border. In 1801 he republished the Complaynt of Scotland, with a learned preliminary Dissertation, Notes, and a Glossary, and was for one year editor of the Scots Magazine. Having manifested a strong desire to set out on an expedition to explore the unknown regions of Africa, his friends, to prevent the execution of this project, procured him the appointment of assistant-surgeon on the Madras establishment, which, however, could only be held by a person who had taken a surgical degree, and this he actually obtained, after six months' unremitting application. Before proceeding to the East he completed his Scenes of Infancy, a poem of much beauty, but inferior in interest and attractiveness to his minor pieces. While in India he devoted himself to the study of oriental literature, but did not long survive the influence of the climate and his over-exertions in his studies. He died 28th August, 1811, at Batavia, from a fever contracted while examining the Indian manuscripts in the unwholesome recesses of a library there. He had accompanied the governor-general, Lord Minto, in the expedition against Java. He had previously held the appointment of professor in the Bengal College, an office which he soon afterwards exchanged for that of a judge at Calcutta. His Poetical Remains, with a Memoir of his Life, were published in 1819. An animated sketch of Dr. Leyden's life is to be found among the Miscellaneous Prose Works of Sir W. Scott; and a new edition of his Poems and Ballads, with Scott's Memoir, was published in 1858. He left many MS. treatises on the eastern languages.

LEYDEN, LUKE OF. See LUKE OF LEYDEN.

LEYDEN-JAR, an instrument for collecting electricity; like all condensers it consists of two conductors, in such positions that induction may take place between them. It is a bottle of thin glass, with a wide neck; it is coated internally and externally on the bottom and sides with tin-foil; the coatings reach about two-thirds of the way up the sides. Thus the sheets of tin-foil are two conductors separated for a short distance by glass, so that no electricity can pass from one to the other, but they may act inductively on one another. A brass rod passes through the cork of the bottle; it terminates outside in a knob, and communicates with the inside coating by means of a chain. The uncovered glass is kept dry outside and inside the jar. When the jar is held in the hand so that the outer coating is connected with the earth, and the knob is brought near the prime conductor of an electric machine, the jar fills with electricity—that is, the inner coating receives a large charge of positive electricity, and the outer receives a slightly smaller charge of negative. The quantity of electricity which may be collected depends on the area of the coatings and on the thinness of the glass. The electricities strive to discharge themselves through the glass, which, if too thin, may be perforated. The jar may be discharged by connecting the outer coating and the knob. Pl. LXI. fig. 5 shows a discharger, BD and DC are brass rods hinged at D; A is a glass handle. The jar may be discharged through the human body; a chain of persons holding each other's hands will receive a shock if they form the connection, the terminal persons touching the outer and inner coatings; a jar has been discharged through a chain of 1500 men, each of whom received a shock. When a jar is discharged the spark produced is very brilliant, owing to the great quantities of electricity in the coatings. Waiting for a short time after a jar has been discharged, we get a second but very small spark by again connecting the knob and outer coating; this is due to the *residual charge*, which seems to consist of electricity which had penetrated for a short distance into the glass, and which could not get back to the surface in time for the first discharge. It is probable that the electricity really resides not on the tin-foil but on the outer and inner surfaces of the glass; for jars with movable coatings have been constructed, and the coatings of the charged jar may be removed and held in the hands, and replaced without sensible alteration being produced in the charge. When a jar is placed on an insulated stool, so that the outer coating is insulated from the earth, a small spark may be obtained from the inner coating on presenting the knuckle, thus the inner coating had a charge of free electricity; the outer coating has now a free charge, when this is discharged the inner coating has again a free charge; in this way (by *alternate contacts*, as it is called) the jar may be gradually discharged. When a number of jars are placed in a box lined with tin-foil connected with the earth, their knobs being joined together, they form a *battery*. A battery will collect from an electric machine a quantity of electricity equal to the sum of the charges which would be received by each jar from the same machine. The discharge of a battery is capable of producing very striking effects—melting fine metallic wires, puncturing plates of glass or card-board, killing animals, rupturing bad conductors, &c.

When a spark passes from the electric machine to the knob of a jar the inside coating becomes positively electrified; this electricity acts inductively (see INDUCTION, ELECTROSTATIC) on the electricity of the outer coating, attracting negative and sending off positive to the ground. Now the outer charge of negative binds or renders latent by induction a great part of the inner charge, so that inside there is very little *free* electricity, and therefore the knob may receive a second charge from the machine; part of this is again rendered latent, and by a repetition of the process a great quantity of positive electricity is bound or rendered latent by a slightly greater quantity of negative in the outer coating. The inner coating has besides a small charge of free electricity. By symbols:—If a is the quantity of electricity which might be received by the inner coating if the outer were absent, the inner charge a binds an outer charge $-am$ (where m is a proper fraction, such as $\frac{3}{4}$ or $\frac{2}{3}$), which reacts and *binds* of the inner charge the

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amount $a m^2$, so that $a - a m^2$ is free. The inner now receives a new charge, $a - (a - a m^2)$ or $a m^2$, which behaves as the first charge did. We find that the whole charge which may be received by the inner coating is $a + a m^2 + a m^4 +$ &c., or $\frac{a}{1 - m^2}$, and the outer charge is $-a m - a m^3 - a m^5 -$ &c., or $\frac{-a m}{1 - m^2}$. The charge is evidently greater as m is more nearly equal to unity. m depends on the *specific inductive capacity* (which see) of the glass, and on its thinness.

L'HÔPITAL, Guillaume François Antoine, Marquis De St. Mesme, a celebrated French mathematician of the seventeenth century. He was born at Paris in 1661, his father being a lieutenant-general in the army, and master of the horse to the Duke of Orleans. After being educated at home, under a private tutor, he entered into the army, but was obliged to quit the service on account of the imperfection of his sight. He then devoted himself exclusively to the study of mathematics, having had John Bernouilli for a short time to give him instructions in the differential and integral calculus. At the age of thirty-two he distinguished himself by solving problems proposed to the lovers of mathematics by James Bernouilli; and 1693 he was admitted an honorary member of the Academy of Sciences at Paris. From that period he published, in the French and foreign journals, solutions of difficult questions, and other mathematical communications. Such was his reputation that Huygens, profound as was his acquaintance with science, did not disdain to apply to him for information relative to the nature of the differential calculus. This led to the publication of his treatise entitled Analyse des Infiniment-petits (1696), the first French work on the subject, of which a new edition was published by Lefevre (Paris, 1781, 4to). The Marquis De l'Hôpital continued his researches with ardour till his death, which took place 2d Feb. 1704. Besides the works mentioned, he was the author of Les Sections Coniques, les Lieux Géométriques, la Construction des Equations; and Une Théorie des Courbes Mécaniques (4to). He was, in private life, a man of integrity, of an open and candid disposition, and of agreeable and polished manners.

L'HÔPITAL, Michel de, an eminent chancellor of France, was born in 1505 at Aigueperse, in Auvergne, and studied jurisprudence in the most celebrated universities of France and Italy. He quickly rose in his profession, and after obtaining the office of councillor of parliament was sent ambassador by Henry II. to the Council of Trent. In 1554 he was made superintendent of the royal finances, in which post, by his ability, economy, and integrity, he restored the exhausted treasury, and put an end to the dishonest practices and the unjust emoluments of a horde of rapacious court favourites, whose enmity he encountered with inflexible steadiness. On the death of Henry II. he was introduced by the Guises into the council of state, which post he gave up to accompany Margaret of Valois, duchess of Savoy, as her chancellor. The confusion which followed in France soon made it necessary to recall a minister of so much talent, and he was advanced to the post of chancellor. He never ceased to advocate toleration, and was the principal author of the edict of 1562, which allowed freedom of worship to Protestants. By this conduct he rendered himself exceedingly odious to the court of Rome, which sought in vain to remove him, until the court came to the sanguinary resolution of exterminating the reformed religion by violence. Finding himself regarded with suspicion and dislike, he anticipated his dismissal by a voluntary retreat to his country-house, where, a few days after, the seals were demanded from him, which he resigned without regret. In lettered ease and in the conversation of a few friends he enjoyed himself with great satisfaction, until the atrocious day of St. Bartholomew in 1572. Upon this event his friends, fearing that he might be made one of its victims, urged him to take measures for his safety; but he not only disdained to seek concealment, but when a party of horsemen, whose motive was unknown, advanced towards his house, he refused to close his gates. They were, in fact, despatched by the queen with express orders to save him. He survived that execrable event a few months only, dying at Vignay March 15, 1573, at the age of sixty-eight. No one was a more determined enemy to injustice; and the reform in legislation produced by him was of the greatest benefit to France. His writings include Latin poems, Harangues before the Estates of Orleans, from which he appears to have excelled less as an orator than as a poet; Memoirs, containing treaties, state papers, &c.; a Discourse in Favour of Peace; and his Testament. The eulogy of L'Hôpital was made a prize subject by the French Academy in 1777, and a statue was erected to him by Louis XVI.

LI (called also *cash*), the common copper coin in China, with a square hole in the middle, and an inscription on one side. The copper is alloyed with lead, and the coin, which is cast, is very brittle. Ten lis make one candareen, 100 a mace, 1000 a lëang or tael, about 5*s.* 10*d.*

LIABILITY, Limited. See Joint-stock Companies.

LIANAS, a term used by travellers to designate those climbing and twining plants found in profusion in tropical climates, where they form thick, woody stems, while in temperate regions they are generally herbaceous. The clematis, honeysuckle, and vine, however, form exceptions, their woody stems receiving the name of *sarmentum*. The term lianas first found currency among French colonists, but it has been adopted by all travellers in the tropics. In many instances they overtop the heads of the tallest trees, when they descend and intertwine the entire forest by their cable-like shoots, forming an impenetrable net-work or matting, which it is necessary to break through with the hatchet. The fauna of those regions pass through these matted and tangled thickets either by means of narrow, embowered passages below, kept open by uninterrupted use, or by passing from bough to bough high above the ground. The thickness of the stems of some of the species of lianas becomes so great that their constriction kills the tree to which they originally adhered, and when this has fallen the magnificent confusion of leaves and flowers presents one of the most striking features of those forest scenes. Vanilla, sarsaparilla, and other medicinal plants are true lianas. Botanically speaking, lianas belong to the most diverse families. They are seldom found in European gardens, from the difficulty of bringing them to perfect bloom by even the most careful treatment under glass.

LIAS, in geology, the name of a formation, consisting of thick argillaceous and calcareous deposits, which constitute the base on which the oolitic series reposes. The word *lias* is of English origin, and is said to be derived from a provincial pronunciation of the word *layers*. The upper portion of these deposits, including about two-thirds of their total depth, consists of beds of a deep blue marl, containing only a few irregular limestone beds. In the lower portion the limestone beds increase in frequency, and assume the peculiar aspect which characterizes the lias, presenting a series of thin stony beds, separated by narrow argillaceous partings, so that the quarries of this rock at a distance assume a striped and riband-like appearance. The lias is remarkable for

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the number and variety of its organic remains, among which are belemnites, ammonites, gryphites, and other shells, together with the remains of saurian or lizard-like animals, of which the ichthyosaurus and plesiosaurus are familiar examples. The lias crosses England from near Whitby, in Yorkshire, to Lyme, in Dorsetshire. See GEOLOGY.

LIBANIUS, a distinguished Greek sophist and rhetorician of the fourth century, was born at Antioch, on the Orontes, probably about A.D. 314, though some assign a date two years later. After receiving some education at Antioch he went to Athens, and had among his teachers Cleobulus, Didymus, and Zenobius. Though he had the certain prospect of obtaining the chair of rhetoric at Athens he was disinclined to accept the office, but not long after he agreed to accept a similar office at Constantinople. The settlement of his private affairs at Athens having produced some delay, he found himself supplanted in Constantinople by a sophist from Cappadocia, and he accordingly opened a private school. So great was his reputation that the public professors soon found themselves without scholars, and charged Libanius with being a magician. The prefect expelled him from the city about A.D. 346, when he retired to Nicomedia, where he met with equal success and incurred equal enmity. After a stay of five years he was recalled to Constantinople, where his reception was so cool that he once more repaired to Nicomedia. After various vicissitudes, among them a second offer of the chair of rhetoric at Athens, which he again declined, he fell into ill-health, and obtained leave from the Emperor Gallus to retire to his native city, where he resided till his death about A.D. 395. He was a favourite with the Emperor Julian, and corresponded with him. Valens and Theodosius also showed him favour; but ill-health and continual squabbles with rival sophists and with the prefects marred his enjoyment of life. Much of this was owing to a disposition somewhat querulous, though naturally gentle and moderate, and to the pride and vanity perhaps inseparable from his profession. No complete edition of his works exists, the fullest being that of Reiske (four vols. Altenb. and Leipzig, 1791–97). J. Ch. Wolf's edition of his Letters (Amsterdam, 1738) is the best. Orations, declamations, letters, a Life of Demosthenes, &c., are among his numerous works.

LIBANUS, MOUNT. See LEBANON.

LIBATION (Latin, *libatio*, from *libare*, to pour out), properly a drink-offering; but used also for other offerings to the gods, as a meal-cake, or something similar placed on the altar, and a part of which was burned. Libations were also made at domestic meals, some of the food being thrown into the fire on the hearth in honour of the *lares*. Of all fruits a small portion was likewise placed on an altar, table, &c., in honour of the gods, or thrown into the sea in honour of the sea deities. A libation always accompanied the sacrifice offered in concluding a treaty with a foreign nation. The libations to the dead were not performed till the ninth day after the burning or interment, and consisted of milk, wine, or blood, and generally concluded the funeral solemnities. In sacrifices the priest was first obliged to taste the wine, usually unmixed (*merum*), with which he sprinkled the victims, and to cause those to do the same who offered the sacrifice. This ceremony was called *libare* (*delibare*), whence it also means to touch or taste something. Among the Grecks the *spondē* or *loibē* was similar to the *libatio* of the Romans.

LIBAU, a seaport town, Russia, government of Courland, at the mouth of the river or lake of the same name, 120 miles W.S.W. of Riga. It is walled, and entered by a single gate; is irregularly built, most of the streets being narrow and ill-paved; and houses, chiefly of wood, and only one story, indifferent. Its trade is considerable. The chief exports are corn, linseed, flax, hemp, leather, butter, wax, honey, tallow, beef, and deals; the imports, colonial produce and manufactured goods. Pop. 9090.

LIBEL, in law, is defined to be the malicious defamation of any person, made public either by writing, printing, or pictures, in order to provoke him to anger, or to expose him to public hatred, contempt, or ridicule. Also such writings as are of a blasphemous, treasonable, seditious, or immoral kind are legally included in the term. When defamatory words are merely spoken in conversation they exist no longer than during the act of giving them utterance, and are heard only by those in whose presence they are used; but when they are committed to paper they become permanent in their nature, and are capable of being disseminated far and wide. Words, again, may be spoken in haste, and without thought; but the act of writing necessarily requires time and deliberation. For these reasons libelling is regarded by our law as a more heinous offence than slandering, which is the technical name for spoken defamation; and numberless expressions are libellous if written and made public, which are not punishable if they are merely spoken, because the *animus injuriandi* is more pronounced in the one case than in the other. Thus, unless the slanderous words be such as tend to cause it to be believed that the person slandered is guilty of some crime punishable by law, as theft or perjury, or that he is infected with some disease which renders him unfit to mix in society; or unless they tend to injure him in the particular trade from which he derives his livelihood; or unless they have actually been productive of some damage to him, they are not actionable, though false. For instance, it is not legal slander to say of a private gentleman that he is a swindler, if he has received no specific damage therefrom, beyond the mere annoyance of having been subjected to such an imputation. But such accusations as these, and all others which hold up individuals to public hatred, contempt, or ridicule, become libellous when the remembrance of them is deliberately perpetuated by their being committed to writing. And the printing of a libel is evidence of publication, because the mechanics employed in printing it are presumed to have read it. Libellers may be brought to punishment by a prosecution on the part of the government, or be compelled to make reparation by a civil action. The civil action is grounded upon the injury which the libel is supposed to occasion to the individual; the public prosecution upon its tendency to provoke a breach of the peace. If the charges contained in the libel are true a civil action cannot be maintained, because it is considered that every man must bear the consequences of his own act; and, therefore, if he has laid himself open to accusation, he must endure it as the natural result of his own crimes or folly. But inasmuch as the malicious propagation even of that which is true is calculated to disturb the public peace, the truth of the libellous matter is no defence by the common law, although it is now by statute 6 and 7 Vict. cap. xcvi., and will in many cases entitle the defendant to the merciful consideration of the court, when it decides upon the *quantum* of punishment to be awarded. The defendant is entitled to plead the truth of what he uttered, and that it was for the public benefit that the matters charged should be published. In civil actions again it is necessary to prove that the publication of the libel was made to others besides the person at whom it is aimed; for, however false and atrocious it may be, it is evident that the person libelled can derive no

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injury from it so long as its very existence is known to none but himself. Therefore an abusive letter, written by one man to another, is not sufficiently published to support an action, unless the writer shows it to a third person, because the person to whom it was addressed cannot be injured by it, unless he himself chooses to make it public; nevertheless the author of such a letter may be prosecuted by indictment, for it equally tends to create a breach of the peace. With these distinctions civil actions and prosecutions for libel stand very much on the same footing. In ordinary cases it is not necessary to prove malice on the part of the libeller; for even supposing that the libel was published without any malicious design, yet the injury to the individual, and the danger to the public peace, are not the less on that account. But although the charges contained in a libel are false, yet under the particular circumstances of certain cases the author is excused, unless express proof can be produced of his having been influenced by hatred or malice. These are called *privileged* communications. It is difficult to lay down any general definition which shall comprise all the occasions when communications are privileged; but perhaps we shall not be far wrong in saying that whenever a communication is made *bonâ fide*, unofficiously, and without malice, and either the person who makes it, or the person to whom it is made, has a real substantial interest in the subject to which it relates, it is a privileged communication, and the mere fact of its not being true will not render the person who makes it liable either to a civil action or to a criminal prosecution. A fair criticism on a public work or print, &c.; a fair comment on a place of public entertainment; a fair and impartial account of the proceedings in a court of justice, and the like, are not considered libellous, unless the subjects to which they relate are in themselves of such an obscene, blasphemous, or scandalous nature, that a due regard to decency enjoins that they should not be publicly discussed, under which circumstances even a correct statement becomes indictable. In a civil action the plaintiff recovers damages, the amount of which is settled by the jury. But upon an indictment the jury has merely to acquit the defendant or to find him guilty, after which the court passes judgment, and awards the punishment, which is generally fine or imprisonment, or both. The jury decide on the criminality of the libel, without being bound by the direction of the judge. In the United States the law is essentially as in England.

LIBEL, in the English ecclesiastical and admiralty courts, is the name given to the formal written statement of the complainant's ground of complaint, in the civil litigation, against the defendant. In Scotch law, an indictment on which either a civil action or criminal prosecution takes place.

LIBELLULA. See DRAGON-FLY.

LIBERAL ARTS. See ARTS.

LIBERIA, a republic, west coast of Africa, midway between Sierra Leone and Cape Palmas, extending 600 miles along the coast, from near the British settlement of Sierra Leone in the north-west, to the river San Pedro, beyond Cape Palmas, in the south-east, with a breadth inland of about 100 miles. It was founded as a colony of free blacks by the American Colonization Society in 1820, under the philanthropic idea that many, if not all, of the liberated slaves would prefer returning to Africa to staying in America, where they were denied political rights. The whole territory of Liberia has been purchased from time to time from the aboriginal owners, under more than twenty treaties, a satisfactory price having in each case been freely paid to the natives. It is well watered, being traversed by several considerable streams. Cotton is indigenous, and yields two crops a year; the cultivation of it succeeds well where it has been tried. Coffee thrives well, a single tree at Monrovia yielding 30 lbs. at one gathering. Sugar-cane grows in unrivalled luxuriance; cam-wood grows in unlimited quantities; and red-wood, barwood, and other dyes are likewise plentiful; the oil-palm is abundant; and indigo, caoutchouc, ginger, arrow-root, cacao, pine-apples, cocoa-nuts, castor-nuts, yams, plantains, bananas, figs, olives, tamarinds, limes, oranges, lemons, &c., may be added to the list of vegetable products, many of which are exported to a greater or less extent. Ivory is easily obtainable, and rich metallic veins exist, only requiring capital to open them up. A considerable export and import trade is now carried on, and a large number of the inhabitants of the interior depend upon Liberia for their supplies of European goods. The Liberians have built many coasting-vessels, and possess a number of large vessels trading with Great Britain and the United States. The Liberians have built for themselves churches of brick and stone, and possess numerous schools, and a considerable number of printing-presses. A thirst for education has likewise been awakened among the surrounding aborigines, many of whom send their children to be educated in the republic. The climate, though very fatal to Europeans, has been greatly improved by clearing, drainage, &c. For political and judicial purposes the republic is divided into counties and townships. The counties are four in number, and called Montserrado, Grand Bassa, Sinoe, and Maryland. Each town is a corporation, with elected municipal officers. Monrovia (pop. 13,000), the capital and port of the colony, is situated on Cape Mesurado; in it resides a British consul. There are besides a number of towns or villages in the territory. The government of the country is on the model of that of the United States, consisting of a president, a vice-president, a senate, and a house of representatives. It is provided that on the increase of the population each additional 10,000 shall have a representative. Liberia was declared an independent state in July, 1847, and in the following year was recognized as such by Great Britain and France, when a treaty of trade and commerce with the state was concluded. A large proportion of the inhabitants speak English. The public revenue is estimated at about £17,000, and the expenditure £24,000. A debt of £100,000 was contracted in 1871, to be redeemed in fifteen years. Pop. 1,068,000, of whom about 19,000 are immigrants from America, the rest natives.

LIBERTINES, or LIBERTINI, a sect of fanatics in the sixteenth century in Holland and Brabant, who placed religion in a perfect union of the soul with God, which having once taken place, all difference between evil and good, sin and virtue, ceased; so that the individual might give himself up to his appetites and passions, as these were no longer bad. The name was also applied in England to the early Anabaptists about the middle of the sixteenth century.

LIBERTY, CAP OF. The right of covering the head was in early times a mark of liberty. Slaves always went bare-headed, and one of the ceremonies of emancipation was the placing a cap on their head by their former master. Thus the cap (or the hat) became the symbol of liberty, and has played a part in many revolutions. The cap was used in France as the symbol of liberty at the beginning of the revolution (1789); and its red colour was borrowed from that of the liberated galley-slaves of Marseilles, who went in great numbers to Paris. The Jacobin Club at Paris afterwards made the red cap a badge of membership, and it was therefore afterwards

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called the *Jacobin cap*. The use of the cap as the symbol of liberty was known to the Romans, the statue of the goddess of liberty, in her famous temple on the Aventine, built by Tiberius Gracchus, being furnished with a cap in one hand, and two poniards in the other.

LIBERTY OF THE PRESS. See PRESS.

LIBI-DIBI. See DIVI-DIVI.

LIBOURNE, a town of France, in the department Gironde, on the right bank of the Dordogne, here joined by the Isle, and crossed by a fine suspension-bridge, 17 miles N.N.E. Bordeaux. It is walled, and built with great regularity, with a large and handsome square in the centre; has spacious and almost mathematically straight streets, lined with elegant houses. The chief buildings are the public library, theatre, museum, and fine cavalry barracks. The manufactures consist of glass, which is important; woollen stuffs, leather, nails, and ropes. It has an important trade in wine, brandy, salt, coal, shiptimber, iron, &c. There are also commodious building-yards. Libourne has courts of first resort and of commerce; a commercial exchange, a school of hydrography, an athenæum, a communal college, and a botanical garden. It is one of the ancient *Bastides* or Free Towns, founded by Edward I. of England in 1286, and figures much in the wars of his times. Pop. (1881), 15,981.

LIBRA, the Roman pound unit for weighing, consisting of 12 ounces. (See As.) The original meaning is *balance*. The term was also applied to a horn measure, used principally for measuring oil, and divided into twelve equal parts by graduated lines. The seventh sign of the zodiac is called *Libra*, because at its first point the ecliptic crosses the equator to the southern hemisphere, and we have then the *autumnal equinox*.

LIBRARIES. The name library is given sometimes to a collection of books, and sometimes to the building in which they are kept. It is the former sense of the term exclusively that this article recognizes. The most ancient library is ascribed to the Egyptian king Osymandyas of Memphis, and recent investigations go far to prove that the ascription has a basis of truth. Pisistratus first founded a library among the Greeks at Athens; Xerxes carried it to Persia, but Seleucus Nicator caused it to be restored to Athens. The most celebrated library of antiquity was the Alexandrian. (See ALEXANDRIAN LIBRARY.) Æmilius Paulus and Lucullus brought the first libraries, as the spoils of war, to Rome. Asinius Pollio founded the first public library, which was also taken in war. Julius Cæsar established a large library, and intrusted it to the care of the learned Varro. Augustus founded two libraries, one of which was called *Palatina*, because it was in the temple of Apollo, on Mount Palatine; the other was in the portico of Octavia, and was called *Octaviana*. The conflagration of Nero destroyed several libraries, which Domitian restored. Trajan founded a very excellent library known as the *Ulpian*. Publius Victor mentions twenty-eight public libraries in Rome; there were, besides, extensive private libraries. These treasures were destroyed or dispersed, partly by the ravages of the barbarians, partly by the iconoclasts. In the ninth and eleventh centuries Basil the Macedonian, emperor of the East, and the learned Comnenian imperial family, made several collections of books, principally in the convents of the Ægean Islands and Mount Athos. The Arabians had, in Alexandria, a considerable library of Arabian books. Al-Mamun collected many Greek manuscripts in Bagdad. In the West libraries were founded in the second half of the eighth century by the encouragement of Charlemagne. In France one of the most celebrated was that in the abbey St. Germain des Prés, near Paris. In Germany the libraries of Fulda, Corvey, and in the eleventh century that of Hirschau, were valuable. In Spain, in the twelfth century, the Moors had seventy public libraries, of which that of Cordova contained 250,000 volumes. In Britain and Italy libraries were also founded with great zeal, particularly in the former country, by Richard Aungerville; in the latter by Petrarch, Boccaccio, and others. After the invention of the art of printing this was done more easily and at less expense. Nicholas V. founded the Vatican library. Cardinal Bessarion bequeathed his excellent library to the church of St. Mark at Venice. See Petit-Radel's interesting Recherches sur les Bibliothèques anciennes et modernes jusqu'à la Fondation de la Bibliothèque Mazarine (Paris, 1819).

The principal libraries of modern times are the national library at Paris (about 1,827,000 printed books, and 92,000 MSS.); the central court library at Munich (probably 1,000,000 books and 18,000 MSS.); the imperial library at St. Petersburg (total number of volumes not less than 1,000,000 and 20,000 MSS.); the imperial library at Vienna (not fewer than 440,000 books and 20,000 MSS.); the university library at Göttingen (perhaps 400,000 books); the royal library at Dresden (350,000 printed books, 182,000 pamphlets, dissertations, and small works not included, and 6500 MSS.); the royal library at Copenhagen (stated variously at 250,000, 400,000, 450,000, and 482,000 volumes—it has 18,000 MSS.); the library of the University of Upsal in Sweden; the library in the Escurial (see ESCURIAL); the royal library at Berlin, (nearly 750,000 volumes and 16,000 MSS.); the academical library at Prague (130,000 volumes and 4000 MSS.); the royal library in Stuttgart (425,000 volumes); the Vatican library at Rome, the number of printed volumes in which cannot be stated accurately, but it is replete with the rarest and most valuable MSS. In Britain the two largest libraries are the Bodleian in Oxford (stated by some at 500,000, by others at 220,000 volumes, but probably containing upwards of 400,000 volumes and 30,000 MSS.), and the library of the British Museum at London, now one of the first in the world, and containing probably more than 1,500,000 printed books and about 50,000 MSS.) Besides the national library there are in Paris those of the Arsenal (200,000 printed books, 6000 MSS.) of St. Geneviève (120,000 printed books, 2392 MSS.), of the Institute (100,000 volumes); of the representative chamber (50,000); and the Mazarin library (150,000). In the rest of France there are 273 public libraries, the principal of which are those of Lyons (containing together more than 600,000 volumes), Bordeaux (190,000), Aix (150,000), &c. The total number of volumes in these provincial libraries is estimated at more than 3,000,000. Access to these great collections is easily obtained both by natives and foreigners. In Italy there are a great number of valuable libraries, of which that at Bologna, founded in 1650, is said to contain 160,000 volumes, 6000 MSS.; the National library at Florence, 400,000 volumes, 15,000 MSS.; and the Laurentian library in the same city, consisting almost entirely of MSS.; the university library at Genoa, 117,000 volumes; the Ambrosian at Milan, nearly 165,000 printed volumes and at least 8000 MSS., but according to others, 140,000 volumes and 15,000 MSS.; that at Modena 90,000 volumes, that of Naples 275,000, and that of St. Mark at Venice 260,000. The Vatican library is very large and famous, but in much disorder; and the Casanata library, also at Rome, is said to contain fully 130,000 volumes. Perhaps the third library in Britain in point of value is the Advocates' Library

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in Edinburgh. (See ADVOCATES' LIBRARY.) The library of the Writers to the Signet is also of considerable magnitude and value, and the four Scottish universities have collections respectively of from 50,000 to 100,000 volumes. The most valuable library in Ireland is that of Trinity College, Dublin, with more than 130,000 volumes. The number of books in foreign libraries is very difficult to be ascertained with precision, and the statements differ so much, that the above estimates are, in many cases, little better than approximations. In the United States of America the principal libraries are the Congress library (396,000 volumes), the Boston public library (395,000 volumes), the Astor library, New York (193,000 volumes), and the library of Harvard College (259,000 volumes).

LIBRARIES' ACTS. The only library in Great Britain maintained at the expense of the state for the use of the public, is that of the British Museum in London. Private libraries, or more properly, libraries belonging to corporations or public bodies, such as the Advocates' Library in Edinburgh, might be consulted habitually by a favoured few on gaining proper introductions. But it was felt that the free use of a valuable library in the various departments of literature, science, and the arts, was a necessity in the larger centres of population, both as a means of education, and of supplying a wholesome intellectual stimulus. Accordingly the legislature has passed several acts empowering districts to establish libraries, and to impose a rate on the inhabitants for that purpose. The first act applied to England alone, and was passed in 1850. By 16 and 17 Victoria (1853), cap. ci., the Public Libraries Act was extended to Ireland and Scotland. Subsequent legislation is that of 17 and 18 Victoria, cap. lxiv.; 18 and 19 Victoria, cap. lxx.; 29 and 30 Victoria, cap. cxiv. The Public Libraries Act (Scotland), 30 and 31 Victoria (1867), cap. xxxvii.; and 34 and 35 Victoria (1871), cap. lix. are the most recent enactments. In towns having a population exceeding 5000 town-councils may, with the consent of two-thirds of the burgesses, resolve to establish a library, and to rate the inhabitants. The act may also be adopted by two-thirds of the ratepayers in parishes of a like population, and in local improvement districts. In Scotland and Ireland the act applies only to boroughs with a population of 10,000. Local boards are not to expend more than one penny in the pound for the purposes of the act. All these libraries are to be open to the public free of all charge.

LIBRATION, an apparent oscillatory motion of the moon, which causes parts near the edge to appear and disappear from time to time. It was discovered by Galileo. If the moon moved round the earth with a uniform angular velocity equal to its angular velocity of rotation on its axis, and if its axis were at right angles to its orbit, the same side of it would always be presented to the earth, and we should see only one-half of its surface; its libration enables us to see about $\frac{4}{7}$ of its surface. Its axis is inclined 1° 32′ 9″ to the perpendicular to its orbit, and therefore parts at the poles of the moon are sometimes visible and sometimes out of sight; this is called *libration in latitude*. Its orbital angular velocity is sometimes slightly greater and sometimes slightly less than its axial angular velocity, hence equatorial parts of the moon near the edge are sometimes visible and sometimes out of sight; this is called *libration in longitude*. There is also a very small diurnal libration due to the motion of an observer on the earth.

LIBYA, with the ancient geographers and historians, had at first mythical boundaries. It was that portion of the north of Africa lying between Egypt, Ethiopia, and the shores of the Atlantic, and bounded to the north by the Mediterranean, and to the south by the mythical river Oceanus. As acquaintance with the region advanced, the equator was substituted for Oceanus. Though Herodotus seems to have known that Africa was a peninsula, the moderns were not aware of this till the Portuguese doubled the Cape of Good Hope in 1497. Homer and Hesiod comprised under Libya all the territory west of Middle and Lower Egypt. The Phœnicians concealed what they knew of it. Herodotus is the first who speaks distinctly and reliably about it, and the Macedonian kings of Egypt, on the development of commerce, necessarily acquired a more exact knowledge of it. But the wars of Rome with Carthage first gave men any accurate knowledge of the interior. The sandy tract in which the Sahara is included was called the Libyan Desert. See AFRICA.

LICATA. See ALICATA.

LICENSE, in law, a grant of permission, a power or authority given to a man to do some lawful act. It is personal to the party on whom it is conferred, and cannot be assigned unless it bear that it is given to a man and his assignees. It may be conferred by word or by deed, and when it is written the paper containing the authority is called a license. A party abusing his license is subject to prosecution as an offender. In most civilized countries it is common to require that persons should not carry on certain trades or professions, or should not be allowed to perform certain acts unless permitted by license. Such licenses may be imposed partly by way of police regulation of traffic, partly as a means of raising a revenue for the state or for municipalities. In Britain, for instance, licenses (under the revenue department of excise) must be taken out for the pursuit and destruction of game, for the sale of wines and spirits, for keeping ale-houses, public-houses, for having male domestic servants, for keeping a dog, for using and carrying a gun, for leave to act as an auctioneer, to carry on the business of pawnbroker, &c. In the United States the laws relating to such matters are different in the different states.

In Great Britain before any person can sell ale, beer, spirits, strong waters, or other excisable liquors by retail in any ale-house, tippling-house, or victualling-house, he must have received a certificate from the local magistrates, and he must further possess an excise license, which cannot be granted without production of the previous certificate. The licensing acts contain provisions relative to the meetings of justices, applications for certificates, the renewal and transference of these in the event of the death or removal of the person licensed, breach of certificates, appeals against decisions, the penalties to be exacted, &c. Neither can the makers and distillers of spirits make and deal in spirits and other excisable commodities unless they have what are called *general licenses*. There have been numerous licensing acts, all of which have much in common, and of which 9 Geo. IV. cap. lxi. (1828) may be taken as the type. To remove doubts as to the meaning of certain words in the act, as 'justice,' 'peace-officer,' 'parish-officer,' 'party,' &c., these are strictly defined, and it is expressly enacted that 'no sheriff's officer, or officer executing the legal process of a court of justice, is capable of using any license under this act.' Instructions are given for annually holding a special session of the justices of the peace, to be called 'the General Annual Licensing Meeting,' for the purpose of granting licenses to suitable persons. The fitness of the person applying for license, and of the house intended to be kept, is to be determined by a majority of the justices, and every license is to be signed by the majority of justices present on the occasion. The steps to be taken by parties

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intending to apply for a license are laid down, and the penalties fixed for breach of certificate. The penalties incurred by unlicensed persons selling or otherwise disposing of excisable liquors are also fixed, and are not to exceed £20, nor be less than £5, together with the costs of conviction. If no fit and proper person should appear to prosecute a charge adjourned to the general or quarter session, the justices may direct a peace-officer of the place in which the house is situate to carry on all proceedings, whose expenses are to be paid out of the county rates. Persons summoned as witnesses, either on the part of the complainant or the accused, who should neglect to appear at the appointed time and place without having a reasonable excuse for their neglect, or who should appear and refuse to give evidence, were to forfeit a sum not exceeding £10. No conviction under the act, and no adjudication made on appeal therefrom, was to be quashed for want of form; and no warrant of commitment was to be held void by reason of a defect therein, if it be therein alleged that the party has been convicted, and that there is a good conviction to sustain the same. The rights and privileges of the Universities of Oxford and Cambridge, and the powers of their respective chancellors and vice-chancellors, as well as those of the master, wardens, freemen, and commonalty of the Vintners' Company, were not to be extended, altered, or in any way affected by the act. This act refers principally to ale-houses, and there are several acts bearing specially on beer-houses, as well as on the holders of wine licenses and of public-house licenses. Occasional licenses may be had for the sale of beer, spirits, wine, &c. Legislation affecting licenses in Scotland has been somewhat different from that on the English statutes. The most important and best-known of the acts affecting Scotland is 16 and 17 Vict. cap. lxvii. (1853), entitled, 'An Act for the better Regulation of Public-houses in Scotland,' but better known as the Forbes Mackenzie Act, from the name of the gentleman, then M.P. for Peeblesshire, who introduced the bill. It prohibited the granting of certificates for liquors consumable on the premises, unless on the condition that no groceries or other provisions to be consumed elsewhere are sold in the same premises with respect to which such certificate is granted; but a grocer's certificate for the retail of excisable liquors, not to be consumed on the premises, can be obtained on certain conditions. The scope of these clauses of the enactment is to prevent grocery stores from becoming tippling-houses. Three grades of licenses were introduced by the bill: 1, for inn or hotel keepers; 2, for public-house keepers; 3, for grocers and provision-dealers. In public-houses no liquor may be drunk or given out before 8 A.M. or after 11 P.M., nor the house be open for the sale of liquors on Sunday. The same restriction of hours as ordinary applies to inns, 'with the exception of refreshment to travellers or to persons requiring to lodge in the same house or premises;' and the Sunday restriction has the qualification, 'except for the accommodation of lodgers and *bonâ-fide* travellers.' By 'inn or hotel' is meant 'a house containing at least four sleeping apartments set apart for the accommodation of travellers.' A provision new to Scotland was inserted in the bill, namely, that any police-officer or constable may at any time enter any public-house or any house where refreshments are sold to be consumed on the premises, and any person refusing admission or offering obstruction is guilty of an offence. On the 25th of April, 1859, a royal commission was issued to inquire into the working of the act, and the finding of the commissioners was that the effect of the act was on the whole beneficial, and that intemperance was gradually descending in the scale of society, and was now chiefly confined to the lowest class of the population. July 7, 1862, the Public-houses Amendment (Scotland) Act, 25 and 26 Vict. cap. xxxv., was passed. By this provision is made for granting a special license to keep a licensed house open and sell liquor therein beyond the hour prescribed for closing (except on Sunday) on occasions of a proper character not originating with the landlord. The power of granting such license is vested in the chief magistrate or two senior acting magistrates of any burgh, or two justices of peace for a county. Licenses are not to be granted where the premises are unsuitable or the applicant of doubtful character and qualifications. Breach of certificate, trafficking without certificate, and shebeen-keeping have separate penalties attached to them, and it is declared that every person drinking in a shebeen is to be held as an offender, and liable on conviction to be fined 10*s.*, or failing immediate payment, to be imprisoned not more than ten days. Persons who, by false representations, induce a public-house keeper or his servant to sell excisable liquors on Sunday, or after time of closing, are liable to a penalty not exceeding £5, or in default of immediate payment, imprisonment not exceeding thirty days. Decisions may be appealed to the Circuit Court, or where there is no circuit, to the High Court of Justiciary, on the ground of corruption, malice, or oppression, or such deviations in point of form as shall have prevented substantial justice having been done. The act 35 and 36 Vict. cap. xciv., 10th August, 1872, is an Act for Regulating the Sale of Intoxicating Liquors, and applicable chiefly to England. It enacts that the sale or exposing for sale of intoxicating liquor without a license, or at any place not named in the license, may be punished for a first offence with a penalty of £50, or a month's imprisonment with or without hard labour; for the second offence with a penalty of £100, or three months' imprisonment with or without hard labour, and disqualification for five years to hold a license; for the third or any subsequent offence with a penalty of £100, or six months' imprisonment with or without hard labour, and disqualification to hold such a license. The same penalties attach to occupants of unlicensed premises where such illicit sale or exposure for sale takes place. Several other offences are noted, as selling liquors to be drunk on the premises by children apparently under the age of sixteen years; selling by other than standard measures properly marked; illicit storing of unlicensed liquors on licensed premises, &c. Offences against public order are then dealt with, and licensed persons are forbidden to permit their premises to be brothels; to harbour constables on duty; to furnish them with liquor, either by way of gift or sale, unless by authority of some superior officer; to bribe or to attempt to bribe them, to suffer any gaming or any unlawful game to be carried on on their premises, or to permit betting therein. Penalties are enacted against adulteration of liquors by certain scheduled deleterious ingredients; the hours of closing are specified, and the entry of constables is provided for. Provision is made for instituting and maintaining a district register in every licensing district, and for the granting of licenses to suitable premises, the justices to decide whether the premises are adapted to the class of license sought. By the concluding sections of it a considerable portion of this act is made applicable to Ireland. Refreshment and wine licenses, instituted for the first time by the 23d and 24th Vict. cap. xxvii., are now placed under the general act of 1872, and houses holding these licenses, both as to opening and closing and matters of police generally, are regulated by the same act. The licensing act of 1874, 37 and 38

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Vict. cap. xlix., while modifying its predecessor in some of its details, is substantially one with it. It is professedly an amendment of the act of 1872. The act of 1874 was amended to a slight extent by the Beer Dealer's Licensing Act, 1882, 45 and 46 Vict. cap. xxxiv. In the metropolitan district retail premises must be shut from midnight on Saturday night till one o'clock in the afternoon of the following Sunday, and on Sunday night from eleven o'clock until five o'clock on the following morning, and on all other days from half an hour after midnight until five o'clock on the same morning. The time of shutting is different for premises situate beyond the metropolitan police district, or in a town or in a populous place as defined by the act, namely, on Saturday night from eleven o'clock until half an hour after noon on the following Sunday, and on Sunday night from ten o'clock until six o'clock on the following morning, and on the nights of all other days from eleven o'clock until six o'clock on the following morning, and if situate elsewhere than in the metropolitan district or the metropolitan police, or such town or populous place as aforesaid, on Saturday night from ten o'clock until half an hour after noon on the following Sunday, and on Sunday night from ten o'clock until six o'clock on the following morning, and on the nights of all other days from ten o'clock until six o'clock on the following morning. Christmas Day and Good Friday, and the days preceding each, are to be regarded as respectively, the former Sundays and the latter Saturdays. The person holding a license is not precluded from selling liquor to be consumed on the premises at any time to *bonâ fide* travellers, or to persons lodging in the house. But the person holding only a six-day license may not sell on Sunday to any person whatever not lodging in his house. The metropolitan district is defined to be 'the city of London or the liberties thereof, or any parish or place for the time being subject to the jurisdiction of the Metropolitan Board of Works, or within the area contained within a circle the radius of which is 4 miles from Charing Cross.'

LICENTIATE, on the Continent an academical dignity between the baccalaureate and the doctorate, and the obtaining of which is a necessary step to taking the doctor's degree. It is said to have been first granted at the University of Bologna. *Licentiate* also signifies the person who has received the degree. A licentiate in theology has the right of delivering theological lectures, and a licentiate in medicine the right to practise. Originally it seems to have been applied only to such as had obtained a license to teach. Among Presbyterians it is applied to a person authorized by the presbytery to preach, and who thus becomes eligible to a pastoral charge.

LICHENS, an order of Cryptogamic or flowerless plants, containing about 2400 known species, which are now arranged under about sixty genera. Their substance is powdery, crustaceous, membranous, coriaceous, or even corneous; and their form that of a horizontal frond, sinuated, lobed, or divided, bearing scattered tubercles and cup-like warts, or branching and coralloid. They are common everywhere, adhering to rocks, the trunks of trees, and barren soil. On ascending mountains they are found flourishing beyond the limit of all other plants, even to the very verge of perpetual snow. Many of them, fixing upon the hardest rocks, by retaining moisture facilitate their decomposition and promote the formation of soil. They are generally perennial, and grow by receiving moisture through all parts of their surface, and though frequently desiccated, the least rain restores their freshness. Many of the species appear to be universally distributed, occurring in all parts of the globe; but the lichens of the equatorial regions and southern hemisphere have not hitherto been satisfactorily examined. Several of the species are used for sustenance in time of scarcity by the inhabitants of the northern regions. The *tripe de roche* of the Canadians, so often resorted to by the fur-traders, is a lichen somewhat resembling the substance from which the name is derived. The reindeer-moss (*Cladonia rangiferina*) is common in sterile soil in many parts of the northern hemisphere; but in the Arctic regions it grows in the greatest profusion, often occupying exclusively extensive tracts of country, covering the ground to the depth of a foot or more, and having the appearance of snow. It is celebrated as being the chief resource of the reindeer in these desolate regions. The Iceland-moss (*Cetraria Islandica*) is also exceedingly abundant in the Arctic regions, and often affords aliment to the inhabitants, either in the form of gruel or bread, which last, though not agreeable, is very nutritious. The taste is bitter, astringent, and mucilaginous. It is an article of commerce, and is frequently employed in pharmacy in the composition of various pectoral lozenges and syrups, and is celebrated as an article of diet, in combination with milk, in coughs and pulmonary affections. The plant consists of a membranous frond, divided into lobes and *laciniæ*, which are unattached, and either smooth or fringed on the margin. It is very abundant in the Alpine region of the White Mountains of New Hampshire, America. Orchal (*Roccella tinctoria*, Orchella weed) is still an important article of commerce, though much less used now than formerly, on account of the fugitiveness of the rich purple and rose coloured dyes which it yields. The colouring matter is called *archil* or *orchil*. (See ARCHIL.) Some of its tints are capable of being fixed, and it is besides employed for staining marble, forming blue veins and spots. It grows on rocks bordering on the sea in the Islands of the Mediterranean, the Azores, Canaries, Cape Verde, and Bourbon. That from the Canaries is most esteemed, and is largely imported into Europe. Several other lichens afford dyes of various colours, some of which can be rendered permanent. Litmus is also obtained from a lichen. See LITMUS.

LICHFIELD, an episcopal city, forming itself a county, in Staffordshire, England, in a pleasant and fertile valley, on the London and North-Western Railway, and 17 miles south-east of Stafford. The principal edifice is the cathedral, presenting, from its elevated site, a very conspicuous object at a distance, and consisting of a large and handsome structure, partly in the early English, and partly in a more recent style, with a richly decorated west front, and three spires—two on the west, each 180, and one in the centre 280 feet high. The other buildings deserving of notice are the church of St. Chad, by far the oldest in the town; the church of St. Mary, a handsome modern edifice, and the church of St. Michael, finely situated, and restored in 1844 in admirable taste; the guild-hall, county court office, the museum and free library, &c. Among schools, the free grammar and national are the most important. At the former of these Addison, Ashmole, Wollaston, Garrick, and Johnson were educated. The chief benevolent institutions are St. John's Hospital, with thirteen alms-houses, a female hospital, and an endowment for the widows and unmarried daughters of clergymen. The manufactures are coaches, and harness, and there are several extensive breweries. The most distinguished native is Dr. Samuel Johnson, to whom a monument has been erected facing the house where he was born. Lichfield sent two members to Parliament previously to the Reform Bill of 1867, when it was deprived of one. Pop. (1881), 8360.

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LICH-GATE, architecture (Anglo-Saxon, *lich*, a corpse, and *gat* or *geat*, a gate), the corpse gate, or covered shed over the entrance to a churchyard, beneath which the bearers of the coffin awaited the arrival of the priest, who there commenced to read the burial service, and thence walked before the mourners to the grave. Originally it was a simple shed-roof supported by wooden posts; and in most parts of England, though chiefly in Herefordshire, Monmouthshire, and Wales, specimens may still be seen. Such as occur in Scotland are for the most part of stone. The most substantial structure of this class to be found in England is that at the entrance of the churchyard of Bray, in Berkshire, which has two rooms over the gateway.

LICHTENBERG'S FIGURES show that positive electricity can more readily spread itself over a non-conducting surface than negative. Let lines be traced with the knob of a Leyden-jar charged positively, and other lines with a jar charged negatively, on a plate of vulcanite. Let red-lead and sulphur be rubbed together in a warm mortar with a pestle; the red-lead becomes positively electrified and the sulphur negatively. Let the powders be thrown on the vulcanite. The red-lead will attach itself wherever there is negative electricity on the vulcanite, and will be found in oval spots; whereas the sulphur attaches itself wherever there is positive electricity, and is found in continuous lines with branching tufts.

LICHTENSTEIN. See LIECHTENSTEIN.

LICTORS, in Rome, were the public servants who attended upon the chief magistrates to fulfil their commands. Their name (*lictores*) was derived from their binding offenders hand and foot before inflicting punishment. The office was borrowed by Romulus from the Etruscans, whose chief magistrates were attended by servants bearing axes tied up in bundles of rods, which were called *fasces*. He was himself always preceded by twelve of them. When the regal dignity was abolished at Rome the royal pomp was retained; and on this account, consuls, prætors, and other important officers (except the censors), were all attended by lictors. When a magistrate of high rank appeared in public the lictors preceded him in a file, following each other. It was their duty to clear the road of the populace, that the consul, or other officer, might not be impeded in his progress; and this was effected by the cry, 'The consul (or prætor, &c.) comes,' 'Make way for the consul.' When he returned to his own house, or entered another, the lictors touched the door with their fasces. The lictors were the executioners of punishments. They were free men, but chosen from among the lowest classes. Not till the time of Tacitus could the office be held by freedmen, and these were often freedmen of the magistrate whom they attended. The dictators, according to some, were preceded by twenty-four lictors; the consuls, decemvirs, and tribunes of the soldiers, by twelve; the prætors and master of the horse, by six; and the vestal virgins by one only.

LIEBIG, JUSTUS, BARON VON, one of the most eminent of modern chemists, was born at Darmstadt on the 8th, or, according to another account, the 12th of May, 1803. He received his early education in the gymnasium of his native town, and when about fifteen years of age was placed by his father in a pharmaceutical establishment at Heppenheim. He afterwards studied in the Universities of Bonn and Erlangen, at the latter of which he graduated as M.D. before he was of age, and then repaired to Paris, where he lived on a stipend allowed him by the Grand-duke of Hesse-Darmstadt. Here he remained two years, and studied with Mitscherlich, afterwards the distinguished professor of chemistry at Berlin. In 1823 he read before the French Academy of Sciences a paper on Fulminic Acid and the Fulminates, which attracted the notice of Alexander von Humboldt, who introduced him to Gay-Lussac and the leading French chemists, and subsequently procured for him the appointment, in 1824, of extraordinary professor, and in 1826 of ordinary professor of chemistry at Giessen, where he laboured for more than a quarter of a century with such activity and success that that small university attracted students of chemistry, not only from all parts of Germany, but even from foreign countries. Among those who resorted to the laboratory at Giessen from Britain were Lyon Playfair, Johnston, Gregory, and others. In 1832 Liebig, in conjunction with his colleague Wöhler, commenced to edit the Annalen der Pharmacie, to which he furnished many papers himself. In 1837 he attended the meeting of the British Association, which was that year held for the first time at Liverpool, and read a paper on Uric Acid, which made such a deep impression on the meeting that he was requested to draw up two reports, one on Isomeric Bodies, and the other on Organic Chemistry. An abstract of the report on Organic Chemistry was read by Dr. Lyon Playfair before the Chemical Section of the Association at Manchester in 1842, under the title of Organic Chemistry applied to Physiology and Pathology. The report was published in full in 1842, and was immediately translated into English and French. In 1848 Professor Gregory of Edinburgh translated from Liebig's manuscript, and published the work on The Motions of the Juices in the Animal Body, and next year his Researches on the Chemistry of Food. Liebig's most popular work is his Familiar Letters on Chemistry, considered in its relation to Industry, Agriculture, and Physiology. These were followed by a second series, and they have since passed through several editions. The edition of 1857 was dedicated to Sir James Clark, who had taken a lively interest in founding the Royal College of Chemistry. The charm of the work is great, indicating one of the sources of Liebig's influence over the public mind. He could invest science with an interest for persons of all stages of culture and all grades of intellectual power. He was the sole author of nearly 300, and the joint author of from thirty to forty, separate memoirs on chemical subjects, which have been published from time to time in the leading scientific journals at home and abroad. Such a man could not fail to receive the highest honours, and in 1845 the Grand-duke of Hesse made him a hereditary baron. In 1852 he was appointed to a professorship in the University of Munich, and to the charge of the laboratory there. In 1860 the Munich Academy of Sciences elected him to be its president, as the successor of Thiersch. He was foreign fellow of most of the scientific societies of Europe and America that recognize chemistry, and he had frequently been invited to fill chairs of chemistry in England and on the Continent. During the last years of his life Liebig was a frequent visitor to England. To mark the estimation in which his labours were held by scientific men everywhere, a subscription was raised in Europe in 1854 for the purpose of presenting him with a public testimonial. A sum of more than £1000 was obtained, with part of which five handsome pieces of plate were purchased, in order that one piece might be handed down to each of his five children in the event of their surviving their father. The remaining portion of the money was handed to him in the form of a cheque. He continued to discharge the duties of his office at Munich till his last illness. He died April 18, 1873. Though Liebig laboured successfully in all departments of science, it was mainly to organic chemistry that he directed his attention, and

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in this department he made many discoveries, and did much to improve the methods of analysis. He was eminently practical in his aims. In his researches on the Chemistry of Food he showed that the proper cooking of food could only be carried on by attention to chemical laws, and that much improvement in the economical and sanitary relations of this art was to be expected from a more extended knowledge of the changes undergone by food in its preparation. His work on Organic Chemistry in its relation to Agriculture gave a decided impetus to the prosecution of farming as a science; and during the political agitation against the corn-laws English farmers were told that, instead of relying on fiscal protection, they should increase their profits by studying the application of Liebig's chemistry to soils and manures. Some of the most valuable contributions of our age to chemical literature have been made by Liebig.

LIECHTENSTEIN, or LICHTENSTEIN, a small principality, practically a portion of the Austro-Hungarian monarchy, is bounded north-east and east by the Austrian circle of Vorarlberg and the Tyrol, south by the Swiss canton of Grisons, and west by the Rhine, which separates it from the canton of St. Gall. In the north it terminates almost in a point; greatest length, north to south, 15 miles; average breadth about 5 miles; area 61 square miles. The surface consists of a low ramification of the Alps, which stretch across the principality from south to north; and of two valleys, one on the east, and the other on the west side of the ridge. The former valley is that of the Samina, so called from a small tributary of the Ill; the latter is part of the eastern valley of the Rhine. The climate is tolerably mild, and the soil almost everywhere fertile—yielding abundance of corn, wine, fruit, and flax. The pastures, too, are excellent, and feed great numbers of cattle. For administrative purposes it is divided into the two lordships of Schellenberg and Liechtenstein. Vaduz or Liechtenstein is the capital; it is a small place, with a population in 1880 of 1001. The family of Liechtenstein is a branch from that of Este. The prince has extensive domains in Germany, and particularly in Moravia, extending together over an area of nearly 2200 square miles, which yield him an annual revenue of £140,000. The annual revenue of the principality itself is about £5000; expenditure, £4400. Austria makes a yearly payment of about £1600 to Liechtenstein on account of its customs' union with the empire. Pop. (1880), 9124.

LIÉGE (Dutch, *Luyk;* German, *Lüttich*), an eastern province of Belgium, with an area of 1117 square miles. Its surface is much diversified. In the south it is mountainous and covered with forests; in the north and north-west the surface is flat. The province belongs to the basin of the Meuse, by which it is traversed from south-west to north-east. About three-fourths of the whole surface are under cultivation; rather more than one-sixth in wood. The banks of the Meuse consist of long sweeps of well-cultivated plains and rich pastures, which extend uninterruptedly without any visible acclivity, and are scarcely ever broken by a hill. The principal crops are wheat, rye, spelt, barley, oats, beans, and pease; hops, clover, and potatoes. The province is rich in mineral treasures, particularly coal and iron. Manufactures have made great progress, and consist principally of broad-cloth, and various articles of iron manufacture, among which fire-arms hold a principal place. In the tenth century it was an independent state, governed by *prince-bishops* of the German Empire. This government continued till 1795, when Belgium was declared a part of France, and this province included in department Ourthe. In 1815 it was restored to Belgium, except in certain portions annexed to Prussia. Pop. in 1880, 663,607.

LIÉGE, a town of Belgium, capital of the above province, 54 miles east by south of Brussels. It stands in a magnificient plain traversed by the Meuse, which is here joined by the Ourthe. Though once strongly fortified, its principal defence is now only a citadel, built on the summit of Sainte-Walburge. The older portion of the town (standing on the left bank of the river) consists of narrow, crooked, dingy, and dirty streets, but improvements in this respect are being rapidly carried on by the opening up of new thoroughfares, the construction of handsome buildings, &c. Several of the quays are well planted, and afford good promenades, and there are eleven spacious squares. The chief of these are the Place du Grand Marché or de l'Hôtel de Ville, adorned with a fine fountain; and the Place St. Lambert. The principal buildings are the Cathedral of St. Paul, in pure Gothic, begun to be rebuilt in the thirteenth century, but not finished till 1557; the church of St. Jacques, one of the finest existing specimens of ogival architecture; the churches of St. Martin, St. Croix, St. John, St. Denis, St. Barthélemy, the last at once one of the oldest and most genuine specimens of the Romanesque period; the Palais de Justice, the ancient residence of the prince-bishops, of an imposing appearance, and adorned with a portico of rich composite columns; the Hôtel de Ville; the university, occupying the extensive buildings of a Jesuit convent, and rich in collections of various kinds; and the Communal College, a large, elegant, and well-arranged structure, which was inaugurated in 1843. Liége is the see of a bishop, and possesses a superior court of justice, with jurisdiction over the provinces of Liége, Limburg, Luxembourg, and Namur; courts of first resort and commerce; a large public library, a botanical garden, and numerous benevolent institutions. The district is rich in coal, iron, lead, and zinc, and there are large iron, lead, and zinc foundries in the town and its vicinity. Machinery, tools, clocks, leather, and woollen goods are extensively manufactured, but the town is chiefly celebrated for its fire-arms, the manufacture of which employs over 30,000 workmen.

Founded in the sixth, Liége was not surrounded with walls and fortifications till the tenth century. In 1212 it was taken by Henry I., Duke of Brabant, and pillaged for six successive days by his soldiers. In 1467 Charles the Bold, duke of Burgundy, having forced an entrance into it, levied enormous sums from the inhabitants and razed its fortifications. In 1691 Marshal Boufflers bombarded it for five days; and in 1702 both the town and citadel were taken by the Duke of Marlborough. Pop. (1880), 123,131.

LIEGNITZ, a town of Prussia, in the province of Silesia, capital of the government and circle of the same name, agreeably situated between the Katzbach and Schwarzwasser, near their junction, and on the Silesian and Saxon Railway, 40 miles W.N.W. of Breslau. It is an old but well-built town, defended by a castle, and surrounded by a boulevard planted with fine trees. It contains five churches, of which that of St. John is particularly deserving of notice; the Ritter Academie, (now reconstructed as a gymnasium), the hospitals of St. Nicolas and Stanislaus, a public library, a magnificent museum, gymnasium, industrial and other schools, barracks, &c. Liegnitz has several courts and public offices, a deaf and dumb institution, and various benevolent endowments. Its manufactures include general machinery and hardware, pianos, gloves, woollen goods, cotton and linen cloth, hosiery, hats, tobacco, &c., and there is a large trade in garden produce, grain, and cattle. Pop. (1880), 37,157.

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LIEN, in law, in its most usual acceptation, signifies 'the right which one person, in certain cases, possesses of detaining property placed in his possession belonging to another, until some demand which the former has is satisfied.' But it is neither a right of property in the thing itself nor a right of action to the thing itself, though the right of lien in a measure allows the person to take the law into his hand. It is, however, not unfrequently used whenever property, either real or personal, is charged with the payment of any debt or duty, every such charge being styled a *lien on the property*, although the latter be not in the possession of the person to whom the debt or duty is due. This second signification would open too wide a field of discussion. We shall therefore confine ourselves to the explanation of the right of detaining, which is the more technical meaning of the two. Liens are of two kinds: 1, *particular liens*, that is, where the person in possession of goods may detain them until a claim, which accrues to him from those identical goods, is satisfied; and 2, *general liens*, that is, where the person in possession may detain the goods, not only for his claim accruing from them, but also for the general balance of his account with the owners. Again, some liens are given by the common law, without any agreement between the parties; some are created by express agreement, and some by usage; which latter, indeed, implies an agreement, because when a man enters into any business where a particular usage is generally adopted, he is presumed to consent to be bound by that usage, unless in his dealings with others he expressly protests against it.

I. The common law gives a lien to the person in possession of goods in three instances: 1. When the common law compels the members of any particular trade or business, without any option on their part, to accept employment from every person who is willing to pay a reasonable compensation in recompense for the burden which it thus throws upon them, it allows them to detain such goods as are delivered to them in the course of their business until the owner has satisfied any debt which may have arisen out of the transaction in which the goods were so delivered. Innkeepers, common carriers, and farriers are entitled to this species of lien; for instance, the proprietor of a coach need not give up a parcel until the carriage of it be paid for. 2. When goods are delivered to a tradesman or any other to expend his labour upon, he is entitled to detain those goods until he is remunerated for the labour which he so expends. Thus a tailor is not obliged to take a customer's cloth and make it into a coat, but if he consents to make the coat, the customer cannot compel him to deliver it until he is paid for the making. 3. When goods have been saved from the perils of the sea the salvor may detain them until his claim for salvage is satisfied; but the finder of goods has in no other case a lien on the goods found, in respect of the trouble and expense to which the finding and preserving of them may have subjected him. All these are particular liens; and therefore the coach proprietor may not detain the parcel, nor may the tailor detain the coat, nor the salvor the property saved, until payment of the carriage of a former parcel, or of the price of another coat, or of salvage which accrued for saving other goods. Another rule with regard to particular liens is that they exist only so long as the possession of the goods is retained by the person who has the lien. If he once deliver up the goods to the owner he waives his lien, which is thereby so effectually annihilated that it will not be revived, even if the same goods should afterwards return into his possession. Thus, if the tailor deliver the coat, and it is afterwards sent to him to be mended, he cannot then detain it as a security for the original price, but only for the cost of mending. His remedy to recover the price must be by a suit at law.

II. General liens are only created by express agreement or by usage. It has been determined that attorneys and solicitors, bankers, factors, and brokers, insurance-brokers, and some others, are, by the custom of their respective trades and professions, entitled to a lien on the property of their clients, customers, and employers for the general balance of their accounts. Thus an attorney may detain papers which have been delivered to him to assist in the conducting of one cause as a security for the costs of another; and if he return them to his client and they come again into his possession, his lien revives; for in the case of a general lien it matters not whether the same or different papers are delivered to the person employed, his right of detaining being the same in both instances.

LIEOU-KIEOU. See Loo-Choo.

LIERRE, or Lier, a town of Belgium, in the province and 10 miles south-east of Antwerp, at the confluence of the Great and Little Nethe. It is surrounded by a rampart planted with trees; is generally well-built; has wide and regular streets, a town-house, five churches, three chapels, three convents, an hospital, prison, and barracks; manufactures of linen, woollen, silken, and cotton fabrics; calico print-works, dye-works, bleacheries, distilleries, breweries, salt-refineries, flour and oil mills; and numerous establishments wherein embroidery and lace-making are carried on. Its commerce is much facilitated by the Nethe, which, up to this point, is navigable at high tides, for vessels of considerable tonnage. Pop. (1880), 17,173.

LIEUTENANT. This word, like captain, and many others, has received gradually a much narrower meaning than it had originally. Its true meaning is a *deputy*, a *substitute*, from the French *lieu* (place, post) and *tenant* (holding). A *lieutenant-général du royaume* was a person invested with almost all the powers of the sovereign. Such was the Count d' Artois (afterwards Charles X.) before Louis XVIII. entered France in 1814. The Duke of Orleans, before he accepted the crown as Louis-Philippe, was appointed to the same office by the chamber of deputies. *Lieutenant-general* is the title of the commanding general of each division of an army, personating the general-in-chief. *Lieutenant-colonel* is the officer between the colonel and major. (See Lieutenant-colonel.) Lieutenant, in military language, signifies the officer next below a captain. The distinction between first and second lieutenants has been abolished in the British army, but retained in that of the United States. A lieutenant in the navy is the officer next in command to the captain of a ship. He takes rank both in the British and United State's services with a captain in the army. In some British colonies, jointly under a governor-general, the chief magistrate of each separate colony is called *lieutenant-governor*.

LIEUTENANT, Lord, of a county, an officer appointed by the crown by patent under the great seal, and the permanent local representative of the sovereign. The office is supposed to have been instituted about the reign of Henry VIII. In the time of Elizabeth Camden speaks of lords-lieutenant as extraordinary magistrates, constituted only in times of danger and difficulty. Their function was to raise and manage the militia of the county in case of a rebellion or invasion. The Long Parliament denied the right of the crown to issue these commissions of lieutenancy, which were merely a supersession of the older commissions of array, and hence the immediate

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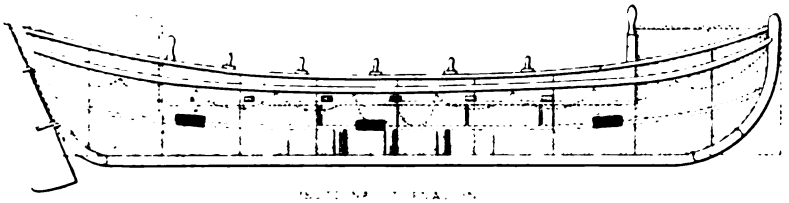
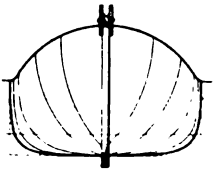
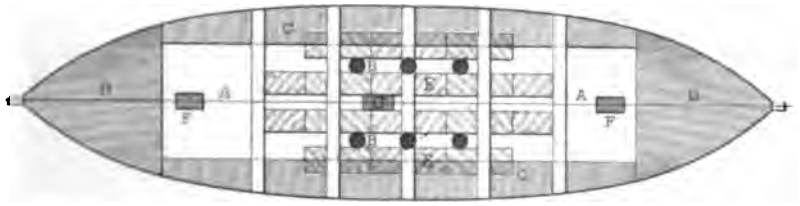
THE LIFE BOAT ON ITS CARRIAGE.



SIDE VIEW OF THE BOAT.



END VIEW.



DECK PLAN.

MIDSHIP SECTION.

THE LIFE BOAT IN THE WAVES.

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cause of the rupture between Charles I. and his subjects. At the Restoration a declaratory act established their legality, and now the lord-lieutenant has power to raise the militia, to form them into regiments, troops, and companies, and to commission colonels, majors, captains, and other subaltern officers. He is invested with similar powers in respect of the volunteer force. He presents to the sovereign for approbation the names of deputy-lieutenants, who are to be selected from the best gentry in the county, —in Scotland to be persons possessing in their own right, or in right of their wives, or to be heirs-apparent to persons possessing estates in property of a prescribed valued rental. From cap. iii. act 1438, we find that the functions of the Scottish lieutenant were somewhat analogous to those of the English lord-lieutenant, but that he exercised in addition to his executive functions occasionally judicial ones. The lord-lieutenant is the settled medium of communication between the government and the magistracy, and is intrusted with the maintenance of the public peace. Justices of the peace are sub-deputy lieutenants. The lord-lieutenant is appointed for life or on good behaviour.

LIEUTENANT-COLONEL, in the British army, is the officer next in rank to a colonel, and the senior of a major. He has actual command of every battalion of a regiment of infantry, and of every regiment of cavalry. After five years' regimental service he is entitled to brevet rank as a colonel; but this makes no difference in his position in the regiment, although it improves his status in the army, all colonels becoming general officers in order of seniority. The lieutenant-colonel is responsible for the discipline of the troops under his command, for the comfort of his men, and for the various details of their organization; and in the performance of his duties he is assisted by the next in command. Each regiment has a colonel who is a general officer, and whose command is merely nominal. These colonelcies are given to distinguished officers, and to princes of the blood, usually with £1000 a year attached. The colonels in the artillery and engineers have substantive duties, and the functions of the lieutenant-colonels are therefore more circumscribed. The pay of a lieutenant-colonel in the Household Cavalry is £1, 3*s.* 6*d.*, and in the infantry of the line 18*s.* per day.

LIFE. To give an unobjectionable definition of life is impossible, as whatever the definition may be it will probably err either from redundancy or defect. Bichat says that life is 'the sum total of the forces that resist death;' Treviranus, that it is 'the constant uniformity of phenomena with diversity of external influences;' Duges, that it is 'the special activity of organized bodies;' and Beclard, that it is 'organization in action.' These definitions are either absolutely unintelligible or they make the arbitrary assumption that without organization there can be no life. Richerand's definition, that life is 'a collection of phenomena that succeed each other during a limited time in an organized body,' assumes also the non-possibility of life disconnected with organization, and is equally descriptive of the changes incident to the decay which goes on after death. De Blainville's definition is: 'Life is the twofold internal movement of composition and decomposition, at once general and continuous.' But according to Mr. Herbert Spencer this conception is in some respects too narrow and in others too wide. Of his own definition, that it is 'the co-ordination of actions,' he says—'like the others this definition includes too much, for it may be said of the solar system with its regularly recurring movements and its self-balancing perturbations, that it also exhibits co-ordination of actions.' His amended conception of life is: 'The definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external coexistences and sequences.' Mr. G. H. Lewes suggests the definition: 'Life is a series of definite and successive changes, both of structure and composition, which take place within an individual without destroying its identity.' This is one of the most satisfactory definitions that has as yet been given, and has the advantage, which all have not, of being intelligible. The most recent attempts have been in the direction of proving that life is merely a form of energy or motion.

LIFE-BOAT, a boat for saving persons from shipwreck, and so constructed that it can live in a stormy sea. It must be constructed with strength sufficient to resist violent shocks from the waves, the rocky beach, or collision with the wreck; be buoyant enough to avoid foundering, and to float though loaded with men and filled with water; have facility in turning; and when capsized be able to right itself. Such boats are now maintained at most of the ports of this kingdom, ready to put to sea at once if their services are required, and provided with the means of being conveyed to the beach and launched with all possible rapidity. The first patent taken for a life-boat was by Mr. Lukin as early as 1785. His boat had strength and buoyancy, but was liable to be disabled by having its sides staved in. In 1789 Mr. Henry Greathead gained the premium offered by the subscribers to the South Shields News-room for the invention of the best form of life-boat, and by the year 1804 his boat had saved nearly 300 lives from vessels wrecked near the mouth of the Tynemouth haven. The Society of Arts in that year voted the inventor their gold medal and fifty guineas. In 1802 Parliament had voted him £1200, and the members of Lloyd's not only gave him a purse of 100 guineas but voted £2000 to encourage the building of life-boats at suitable stations. Greathead's boat had the form of the quarter of a spheroid, and was cased and lined with cork, which rendered it so buoyant that it could float and do service though almost knocked to pieces. A life-boat, which procured for its inventor, Mr. Wilson, the gold medal of the Society of Arts, was produced in 1807, but its principle was almost identical with that of Lukin's boat. Till 1851 Mr. Greathead's invention was almost the sole one in use though numerous others had been either introduced or proposed; but in that year no fewer than fifty models of improved life-boats were sent to the Great Exhibition, selected from 280 plans and models submitted in competition for a prize offered the year before by the Duke of Northumberland for an improved construction. The prize was awarded to Mr. Beeching of Yarmouth as the constructor of the life-boat combining the largest number of good qualities; but Mr. Peake of Woolwich Dockyard, by combining the excellencies of the competitive boats, and adding others suggested by his own experience, designed a boat which, gradually improved from time to time, is now the recognized English model, and has been adopted by the National Life-boat Institution as the standard for the boats which they should station on the coasts. From the Annual Report of the Royal National Life-boat Institution for 1883 we extract the following detailed description of one of their life-boats in the latest stage of its development. (See Plate CXIII.) These figures are intended to show the general form, the nature of the fittings and air-chambers of one of these boats 33 feet in length and 8 in breadth. The report says that this life-boat possesses in the highest degree all the qualities which it is desirable that a life-boat should possess:—1. Great lateral stability, or resistance to upsetting. 2. Speed against a heavy sea. 3. Facility for launching

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and taking the shore. 4. Immediate self-discharge of any water breaking into her. 5. The important advantage of self-righting if upset. 6. Strength. 7. Stowage-room for a large number of passengers. In the elevation and deck plan the general exterior form of the boat is shown, with the sheer of gunwale, length of keel, and rake of stem and stern posts. The dotted lines of fig. 1 (sectional elevation) show the position and dimensions of the air-chambers within board, the relieving-tubes, and ballast. In fig. 2 (deck-plan) A represents the deck, B the relieving-tubes (6 inches in diameter), C the side air-cases, D the end air-chambers, E ballast, F scuttles to admit of a free current of air under the water-tight deck, G scuttle for air, and to receive pump. In fig. 3 (body-plan) the exterior form of transverse sections, at different distances from stem to stern, is shown. Fig. 4 (mid-ship section) represents a mid-ship transverse section, A being sections of the side air-cases, B the relieving-tubes of the same depth as the space between the deck and the boat's floor. C, C, C, C are spaces beneath the deck, placed longitudinally at the mid-ship part of the boat, with cases packed with cork, forming a portion of the ballast; *d* scuttle for ventilation, having a pump fixed in it by which any leakage beneath the deck can be pumped out by one of the crew whilst afloat. The festooned lines in fig. 1 represent exterior life-lines attached round the entire length of the boat, to which persons in the water may cling till they can be got into the boat; the two central lines are festooned lower than the others, to be used as stirrups, so that a person in the water by stepping on them may climb into the boat without assistance. The great breadth of beam (8 feet) in proportion to her length (33 feet) is to diminish the liability to capsize in a heavy sea. The relieving-tubes, by which any water that breaks into the boat is immediately self-discharged, are a most beautiful contrivance. Such are the precautions for the safety of the crew that loss of life in the conduct of the boat is of rare occurrence. The life-boat transporting carriage (see plate) is an important auxiliary to the boat. The life-boat is kept on this carriage in the boat-house ready for immediate transportation to the spot most favourable for launching to the wreck. In this way a greater extent of coast can secure the benefits of the life-boat than could otherwise be the case. Even when the launch is from the immediate vicinity of the boat-house the use of the carriage saves much time, which in a case of shipwreck may prove of the last importance. Besides, a boat can be readily launched from a carriage through a high surf, when without a carriage she could not be got off the beach. The machine is admirably contrived, and the boat may be launched from it in an upright position with her crew on board. To render it more manageable and of the greatest possible utility, the fore and main bodies can be detached from each other by the withdrawal of a fore-lock pin.

The Royal National Life-boat Institution was formally incorporated in 1824. It depends for its support on voluntary contributions, and these have hitherto been sufficiently liberal to enable it to prosecute the objects sought to be attained by it with tolerable efficiency. From the Report for 1883 we gather that the number of lives saved during the fifty-nine years from the establishment of the Institution in 1824 to the end of the year 1882 either by its life-boats or by special exertions for which it has granted rewards, was 29,608. In 1882 the total of lives saved was 884. The finances of the Institution are on the whole in a favourable state. Income for 1871, £28,140, 4*s.* 3*d.*; expenditure, £27,535, 16*s.* 8*d.* In 1882 the total amount of the receipts was £43,117, and the expenditure, including liabilities still to be met, was £36,746. In the year 1882 there belonged to or was connected with the Institution a noble fleet of 273 splendid life-boats perfectly equipped.

LIFE-BUOYS, LIFE-RAFTS, &c. Various kinds of buoys or other apparatus for the preservation of human life in cases of shipwreck have been invented. Mr. Wood, collector of the customs and receiver of wreck at Harwich, submitted to the admiralty the plan of a life-raft, and in 1870 presented the public with the right to use it. Lloyd's committee has commended it. It is triangular in shape, and constructed of wood, cork, and rope-netting. It has the advantage of being handy, and could be easily hauled to and fro between a ship in danger and the shore. Cook's and Rodger's patent life-rafts are merely square frames buoyed up by a cask at each corner. Empty water-casks well bunged up are very ready and effective instruments of safety in shipwreck, and should have ropes attached to them to hold on by. Frames of bamboo and inflated skins have long been in use as life-preservers among different nations, and contrivances more or less ingenious to preserve the buoyancy of the body in case of accidental immersion in water, are resorted to in all countries. Whatever is lighter than water, if used on account of its buoyancy as a means of personal safety, may be considered a life-buoy. Some of the older life-buoys attached to the taffrails of ships to be detached in cases of emergency, such as of a man falling overboard, had the means of igniting a blue light for the guidance of the man in the water by the mere act of letting go. Such life-buoys generally consisted of two casks connected by a bar, from which there stood up a hollow pole or mast, into which was inserted from below an iron rod whose lower extremity was loaded with lead in such a manner that when the buoy was let go the iron slipped down to a certain extent, lengthened the lever, and enabled the lead at the end to act as ballast. The weight at the end of the rod was arranged so as to afford secure footing for two persons; and there were also large rope beckets, through which others could thrust their head and shoulders till assistance arrived. India-rubber has been largely used in the construction of life-buoys, generally in the form of belts which can be easily inflated by the wearer in the course of a few seconds. They are very buoyant and portable, but easily punctured or torn, and soon decay if put aside while damp. Hence the interior came to be divided into cells or compartments, so that the rupture of one effects only a partial damage. Another sort is in the form of a waistcoat; and inflated pillows and mattresses made on the same principle have been found very effective. At the Great Exhibition of 1851 an inflated mattress sustained a weight of 96 lbs. for five days without being injured. Naval officers have also strongly recommended mattresses stuffed with cork. Johnson's life-belt consists of two cushions strapped tightly round, and may be made of any light substance incased in water-proof cloth. In 1868 Commander Bourchier communicated to the Institute of Naval Architects a description of a life-buoy constructed of hollow metal casing, shaped so that a seaman could sit or stand in the middle of it, and have a provision of 6 gallons of water, two signal flags, and two signal port-fires. This seems to be more ingenious than practically useful. The life-buoy most favoured by seamen of late years is composed of slices of cork so neatly arranged that they form a buoyant zone about 32 inches in diameter, 6 inches wide, and 4 inches thick. It contains about 12 lbs. of cork, is compactly covered with painted canvas to protect it from being injured by the water, and furnished with looped life-lines, that several, if necessary, may at once have a convenient hold

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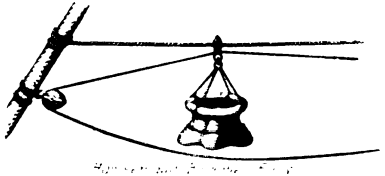

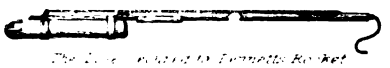

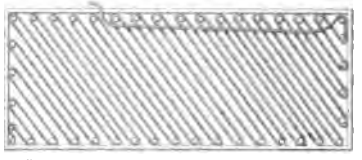

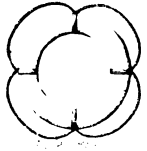

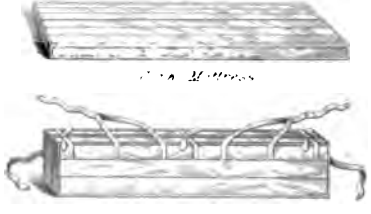

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Six persons, each 10 stone, could be supported by one of these life-buoys, and making allowance for the weight of clothes and the want of composure often exhibited in circumstances of peril, this would support four men with certainty. The prejudice against life-buoys, once irrationally violent among seamen, is gradually diminishing. This is due in great part to the efforts of the National Life-boat Institution, the success of whose precautionary measures in providing for the safety of their crews has tended both to show the value of precaution, and to discredit the long-prevalent idea that precaution and intrepidity were incompatible. From one of their Reports we extract the following information about the life-belts in use by the crews of the life-boats of the Institution. The requisite qualities of a life-boatman's life-belt are —1. Sufficient extra buoyancy to support a man heavily clothed with his head and shoulders above the water, or to enable him to support another person besides himself. 2. Perfect flexibility, so as readily to conform to the shape of the wearer. 3. A division into two zones, an upper and lower, so that between the two it may be secured tightly round the waist. While confined closely and securely round the body, there must not be such pressure over the chest and ribs as may materially affect the free action of the lungs, or impede the muscular movement of the chest and arms. 4. Strength, durability, and non-liability to injury. For illustrations of the several kinds of life-preservers mentioned in this article, see Plate CXIV., APPARATUS FOR SAVING LIFE IN CASE OF SHIPWRECK.

LIFE-ESTATE, in English law, is a freehold not of inheritance, an estate or interest in real property for a life, and is either conventional or legal. A conventional life-estate is expressly created by the act of the parties, and is for the life of the owner, or for the life of another, in which case it is called an estate *pur auter vie*. A legal life-estate is either tenancy-in-tail after possibility of issue extinct; or what is technically designated *courtesy of England*, that is, the life-interest held by a husband in his wife's fee-simple or fee-tail estates, general or special, after her death; or *dower*, that is, the right which a wife has for her life in the third part of the lands and tenements held in fee-simple, fee-tail-general, or as heir in special tail by her husband at the time of his decease. The tenant for life may cut wood to repair fences and for household fuel. If there is an open mine on the estate he may work it for his own profit, but he cannot open one.

LIFE-INSURANCE. See INSURANCE.

LIFE-RENT, in Scotch law, means the right of use for life to a sum of money or an heritable subject, the person enjoying it being called a life-renter, the proprietor of the subject the fiar, and the subject the fee. There must be no destroying or wasting of the substance of the fee. The terce and the courtesy, corresponding to the dower and the courtesy of England, as defined under LIFE-ESTATE, are the legal life-rents of the Scotch law. The conventional life-rents are divided into simple life-rents, and life-rents by reservation. Life-rent is extinguished by the death of the life-renter, and also by renunciation without recording. The rights and obligations of a life-renter are similar to those of a tenant for life in England.

LIFE-ROCKETS, projectiles to communicate between a distressed ship and the shore. These are especially useful where no life-boat can be had, or where it cannot be used on account of the roughness of the sea and the shoaliness of the coast. They are available, however, only at moderate distances from the shore. By means of them a rope is thrown either from the ship to the shore, or from the shore to the ship, generally the latter, and when communication is thus established a slinging apparatus may bring the crew ashore one by one. Of the numerous projectiles for life-preserving purposes one of the simplest is Captain Ward's *hearing-stick*, which can be discharged by hand, but cannot be relied on for distances greater than 50 yards. A piece of stout cane 2 feet long, one end loaded with 2 lbs. of lead, and the other attached to a thin line, is whirled vertically twice or thrice, and then discharged. Kites have been tried, but cannot be relied on with certainty, the most reliable missiles being those that are discharged from a mortar or rocket by gunpowder, having a line attached to them. The first trial of this kind was made in 1791 by Sergeant Bell, of the Royal Artillery, who fired his projectile from the ship to the shore, but it was soon perceived that it was better to fire from the shore to the ship. The *life-mortar* of Captain Manby was invented in 1807, and is practically still that in use, though variations in details have been made on it from time to time. His missile was a shot with curved barbs, resembling the flukes of an anchor, to grapple the rigging or the bulwarks of a ship. The shot was fastened to the rope by strips of raw hide. There was a contrivance for rendering the rope visible to the crew, and another to assist those on shore to descry the exact position of the ship in distress. Instead of Captain Manby's shot Colonel Boxer substituted a bolt with four holes at the end, in each of which a fuse was inserted, the light from which indicated the path of the bolt through the air. In 1821 a rocket apparatus was invented by Tengrove, but it has not been much used on account of some practical difficulties which were never remedied. Dennett's apparatus was invented in 1832, and had a range of 250 yards. Within two years its usefulness had been so fully established that the board of customs had recommended its adoption at many of the coast-guard stations. Instead of an ordinary sky-rocket Carte substituted a congreve rocket in an apparatus contrived by him in 1842, but his invention was never adopted by the authorities. Mr. Dennett increased the range of his projectile to 400 yards by attaching two rockets side by side to the same stick, but the advantage of a greater range was more than counterbalanced by uncertainty and inequality of action. Colonel Delvigne's *life-arrow*, a cue-shaped stick of mahogany, with the thinner end projecting beyond the end of the barrel, is fired from an ordinary musket, and can carry 80 yards with a mackerel line attached. Tremblay's rocket, with a barbed head, had the same defects as Sergeant Bell's invention: that it had to be fired from the ship to the shore. Instead of Dennett's unsatisfactory arrangement of parallel rockets on one stick, Colonel Boxer placed two rockets in one tube—the one behind the other—the rocket behind giving a further impetus to the case and its attached line after the rocket in front had expended its projectile force. The best lines are those made of loosely-spun Italian hemp. There are several ways of arranging the line so that it may run out quickly without kinking or entangling. Dennett's faking-box for this purpose, which is now generally adopted, is sketched in Plate CXIV. The sling life-buoy is employed in conjunction with the rocket-apparatus. It is popularly known as *petticoat breeches*, and is represented in the plate as the *breeches buoy*. It is neither a belt nor a buoy, but a kind of garment or stays in which a man may be slung clear out of the water. It was invented by Lieutenant Kisbee, and consists of a circular cork life-buoy, having a pair of canvas breeches attached to it. The legs of the occupant protrude below the breeches, while his armpits rest on the buoy. The shipwrecked crew are by

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this means brought to the shore one by one. Further improvements have been since made on the rocket-apparatus. The most ingenious of those recently devised is Rogers' life-anchor. In 1868 it obtained the prize of £50 offered by the Shipwrecked Fishermen and Mariners' Royal Benevolent Society for 'the best mode for communicating with a ship on shore, or between two vessels at sea.' It consists of a three-fluked anchor, 12 lbs. in weight, having the flukes so hinged that they pack closely together. When the anchor has been shot out from a mortar or rocket 100 or 200 yards, the flukes open and fasten to the beach or to a ship, and thus a hold is furnished for dragging boats or men ashore. In 1870 its capabilities were severely tested by the officers of the gunnery-ship *Excellent*. Till 1855 the life-mortars in use in cases of shipwreck were partly under the control of the admiralty, partly under the board of customs, partly under the life-rocket department of the board of trade, and partly under the control of private individuals. The Merchant Shipping Act of 1854 put the management of the life-rockets entirely under the board of trade. There are fifty-nine coast-guard divisions or wreck registrars' districts, in which there are numerous stations. Some of these are provided with mortars only, some with rockets only, and the rest with both mortars and rockets. The rockets are made at the Royal Laboratory, Woolwich, and on requisition from the board of trade are supplied to the stations by the war department. At each station a cart is kept always ready packed with all the requisites for the rocket apparatus, and can thus be despatched at once on any emergency. Care is taken that the supplies are regularly renewed before the old are exhausted. The men of the coast-guard are employed in working out the system, and in addition to their pay for regular service they receive a fixed allowance for periodical drilling. Volunteer rocket corps are also established on certain parts of the coast. Annual parliamentary grants are made to enable the board of trade to reward special services either with gifts of money, medals, watches, or nautical instruments. The Mercantile Marine Fund also contributes for this purpose.

LIFTS, Hydraulic, &c. Hydraulic lifts are now in common use for raising goods or persons from one story of a building to another. They consist of a cage or platform suspended by a rope or chain, and rise vertically in a shaft within the building, the motive power being the pressure of water on the plunger of a hydraulic press placed beneath the cage. At the Brighton Hotel the lifts work in square shafts about 8 feet across internally, constructed the entire height of the building, and having apertures that communicate with each story. A cage suspended by a chain is placed within this shaft. The chain passes over a wheel at the top of the shaft, and has balance-weights fixed to the other extremity. The hydraulic press is placed in a well sunk as far below the basement of the building as is the height to which the cage must be elevated. An iron barrel with a long plunger fitting loosely in it, and working through a water-tight stuffing-box at the top, constitutes the press, and the water acting on it comes from a cistern raised 120 feet above the top of the press-cylinder. Ships are lifted for repair by means of contrivances called *lifts*, which are either screws, hydraulic-presses, or balance-pontoons. Many lifts are worked entirely by steam-power, and have no water-ram. At the General Post-office the lifts consist of several shelves attached to an endless chain, like buckets to a chain-pump. On shipboard the ropes used for hoisting, lowering, and maintaining the several yards in position are also termed *lifts*. They pass in pairs from the deck over pulleys at the mast-head, and thence to near the extremities of the yard. The yard to which it is attached determines the designation of the lift.

LIGAMENT, the term applied in anatomy, human and comparative, to bands of white fibrous tissue which connect bones. To this class of tissue also belong the tendons or sinews of muscles, by which these structures are attached to the surfaces of bones. Ligaments differ from tendons in being of a stouter structure, and less liable to give way or to be ruptured. When ligaments break during life they seldom snap across or transversely, but generally tear in an irregular manner. Tendons, on the contrary, when subjected to great strains, break across. Ligaments possess little or no elasticity, and when stretched do not recover their resiliency. To the same class of structures as ligaments and tendons, the *fascia* or sheet-like bands of white fibrous tissue spread over muscles and regions also belongs. Microscopically examined, both ligament and allied structures exhibit sets of fibres arranged in parallel bundles, imbedded among which little nucleated bodies known as *connective-tissue corpuscles* are seen. These latter are minute corpuscles of various shapes, and their function has been assumed to be that of ministering to the growth and nutrition of the fibres amidst which they are placed.

LIGAN. See Flotsam.

LIGATURE, in surgery, is the binding of any part of the body with a cord, band, fillet, &c., whether of leather, linen, or any other matter. Ligatures are used to extend or replace bones that are broken or dislocated; to tie the patients down in lithotomy and amputations; to secure the splints that are applied to fractures; to tie up the processes of the *peritoneum* with the spermatic vessels in castration; and lastly, in taking off warts or other excrescences by ligature. *Ligature* is also used to signify a kind of bandage or fillet, tied round the neck, arm, leg, or other part of the bodies of men or beasts, to divert or drive off some disease, accident, &c.

LIGHT, the agent which enables us through the organ of sight to take cognizance of objects; it has a heating and chemical action which is all-important to animals and plants. The sun, the fixed stars, nebulæ, certain meteors, and terrestrial bodies in a state of incandescence or phosphorescence are self-luminous. (See Ignition, Luminosity, Phosphorescence.) That light proceeds in straight lines in all directions from a luminous point was an early discovery; perhaps the path of a ray of light first gave the notion of a straight line. An obstacle which will prevent the eye from receiving light from a luminous point must lie in a straight line between the eye and the point; sunlight passing through a small aperture in a window-shutter illuminates a straight path in the dust of a room. When light enters a room only at a small aperture every point of an object outside sends a ray of light through the aperture. A white screen properly placed inside the room is illuminated at certain points by these rays of light and therefore exhibits an image of the object, which is properly coloured, and is small or large as the screen is near or distant from the aperture. When a screen is illuminated by light from a very small gas flame an obstacle may prevent light from reaching certain parts of the screen, that is, it will throw a sharply defined shadow. When the source of light is large the shadow is not sharply defined, for parts towards the boundary of the shadow may be illuminated by some parts of the source and not by others. The sun is a large luminous body; a planet prevents the illumination of any body which happens to be placed in the umbra, a certain conical space behind it, and causes a partial shadow on a body which happens to be in the penumbra, a space surrounding the umbra. When a screen is illuminated by a source of light every point of the source sends innumerable rays

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of light to all parts of the screen; it is easy to show by geometry, that as rays of light are straight lines, when a screen is removed to twice or three times its distance from a luminous point it receives only one-fourth or one-ninth of the light which it received formerly. This is the law of inverse squares, or,—the intensity of the light received from a luminous point is inversely proportional to the square of the distance from the point. Advantage is taken of this fact in determining the relative illuminating powers of two sources of light. (See PHOTOMETER.) In 1676 Rœmar discovered from apparent discrepancies in the observed times of the eclipses of Jupiter's satellites, that light is not instantaneously propagated from luminous bodies to the eye; and he calculated its velocity. Bradley afterwards determined the same velocity from the aberration of the fixed stars. Fizeau measured it more directly at Paris, and Foucault determined it by experiment in his laboratory. Foucault showed that the velocity of light when passing through glass or water was less than when passing through a vacuum, a fact of great importance in establishing the undulatory theory of light. See VELOCITY OF LIGHT.

When light falls upon the surface of a body part of it is reflected. When the surface is smooth and regular an eye placed to receive the reflected rays generally observes an image of the source of light, and the surface may be called a mirror. When it is not smooth the light which falls upon it is scattered in all directions, so that the surface itself becomes visible; planets and nearly all terrestrial objects become visible in this way by means of reflected solar light. Only part of the light which falls upon the surface of a body is reflected, the rest enters into the body, which absorbs or destroys part of it and allows the rest to pass through. When light falls nearly vertically on a glass surface very little of it is reflected, but as the incidence becomes more and more oblique a greater and greater proportion of the light is reflected. Polished metals, particularly silver, are good reflectors of light at all incidences, and hence metallic surfaces are most commonly used as mirrors. The law of reflection was known to Archimedes; it is—the incident and reflected rays make equal angles with a perpendicular to the surface. To prove this law direct a theodolite to the image of a star seen by reflection at the surface of mercury in a basin, direct the theodolite to the star itself, it is found that the angle through which the instrument is turned is twice the altitude of the star. Geometry shows that this is a proof of the above law. It may also be shown that the incident and reflected rays are in a plane at right angles to the reflecting surface. (See REFLECTION.) When light falls upon a body only part of it is reflected, the rest enters into the body and may be transmitted. When a ray has passed obliquely from air into water, although in the water as in the air it is a straight line, this is not a mere continuation of its old path. This *refraction* or bending of a ray when it passes from one medium, such as air, into another homogeneous medium, such as glass or water, or from air into denser air, was the subject of inquiry from the twelfth century. The law of refraction was discovered in the seventeenth century; it is—whatever be the obliquity of a ray passing from one medium to another the sines of the angles made by the incident and refracted rays with the perpendicular to the refracting surface are in a constant ratio, which has been called the index of refraction. It may also be shown that the incident and refracted rays are in a plane at right angles to the refracting surface. (See REFRACTION, INDEX OF REFRACTION.) When a ray of light passes through a medium, such as the atmosphere, which continuously varies in density from place to place, its direction continuously changes, so that it is a curved line (see MIRAGE); this is of importance to astronomers. When an object is seen by rays which have passed through different media it appears to be distorted in shape. The application of mathematics to the two laws of reflection and refraction is called *Optics:* this science includes the formation of images by mirrors and lenses, the eye, microscopes, telescopes, &c. See OPTICS, EYE, MIRROR, LENS, MICROSCOPE, PRISM, TELESCOPE.

Newton found that red light is not so much refracted as blue light when it passes from one medium to another. When a ray of solar light is refracted in passing through a glass prism he found that a great number of rays of different colours left the prism, the blue ray being most bent from its former path and the red ray least. (See PRISM, RAINBOW.) Letting these rays fall upon a screen he obtained a band of colours which he called a spectrum. Thus he had decomposed solar light and found it to consist of a mixture of lights of every gradation of refrangibility. On permitting all the coloured rays to pass through a lens before falling on the screen they combined and became white light again. Fraunhofer let a beam of solar light pass through a narrow slit and then through a prism; the spectrum was a rectangular band, one end of the rectangle being red and the other violet. On careful examination he found that a great number of colours or rays of particular refrangibilities were wanting, their places being supplied by dark lines in the spectrum. He carefully determined the position of some thousands of these lines. (See SPECTRUM.) The light from a white-hot solid is found to give a continuous spectrum, that is, a spectrum with no break in it from the red end to the violet. Burning vapours (unless in a very dense state) do not give continuous spectra; in fact, the spectrum consists of one or more bright lines of different colours; for instance, the spectrum of sodium vapour is one yellow line,[1] so that sodium vapour emits monochromatic light; lithium, two red lines at some distance apart; thallium, one green line; indium, one blue line and one indigo line; hydrogen, one red line, one bluish green, and one violet. The characteristic spectrum of a vapour affords an easy means of detecting its presence in any burning compound. Kirchoff allowed the light from a white-hot solid to pass through burning sodium vapour, and he found that the spectrum was no longer continuous but possessed one dark line in the yellow, showing that the sodium vapour had absorbed one particular kind of light. Now this dark line exactly corresponded with the bright line of the sodium spectrum. Thus Kirchoff showed that a burning vapour absorbed light of exactly the same kind as that which it emits. (See HEAT EXCHANGES, LAW OF.) He found dark lines in the solar spectrum which exactly corresponded with bright lines in the spectra of sodium, hydrogen, iron, magnesium, potassium, calcium, zinc, &c., and he came to the conclusion that the sun has an envelope composed of these heated vapours. Huggins has examined the spectra of many heavenly bodies; he finds that many stars give spectra like that of our sun, and that many nebulæ must be masses of burning vapour, as their spectra consist of a number of bright lines. See SUN, SPECTRUM.

In Newton's experiment any of the coloured rays leaving the prism may be intercepted and the others allowed to fall together on the screen. Clerk Maxwell finds that any colour may be imitated in its effects on the retina by properly combining three others; it seems, therefore, that the retina has three

[1] Really two or more yellow lines very close together.

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distinct sensations, and that any colour is distinguished by its producing in different proportions these three peculiar effects on the retina. Complementary lights are those which when united produce the effect of white light in the eye. Yellow and blue lights are complementary. When light falls upon the surface separating two media part of it is reflected; in this reflection there appears to be very little selective action; green light is reflected with the same ease as red, for instance. But when light enters the second medium part of it is absorbed, and this absorption is selective; thus when solar rays enter heated sodium vapour all the light which happens to have a certain tint of yellow is absorbed and the remaining light is transmitted. When white light enters red glass certain particular colours are absorbed, and the remaining light appears with a reddish tinge; this red light may be transmitted through a second plate of red glass without any sensible diminution of intensity, but it will be nearly all absorbed if allowed to pass into a plate of green glass. When light suffers absorption in passing through a number of plates of glass of the same kind, the greatest absorption takes place in the first plate, and the last plate causes very little change in the character of the light. The absorption produced by chemical solutions is best studied by finding the changes which different thicknesses of them produce in a continuous spectrum. The colour of a body seen by reflected light is nearly always due to absorption, that is, the light enters the body for a short distance, is reflected internally, and suffers absorption before reaching the eye. Sea-water transmits green light most readily; solar light enters the water and is reflected from small suspended solid particles; in its passage to the eye it suffers absorption and appears green. The colour of a pigment is due to the light which remains after white light has undergone internal reflection and absorption. It is easy to see that the colour of a mixture of two pigments is not due to a mixture of the lights which would come from the separate pigments. It is well known that a mixture of yellow and blue lights produces in the eye the effect of white light, whereas a mixture of yellow and blue pigments sends to the eye all the colours which are common to both, and therefore has a green tinge.

In Newton's experiment with solar light and the prism we find that the blue and green rays do not affect a thermometer, the yellow rays affect it slightly, and the extreme red rays possess great heating properties; moreover, when the thermometer is passed beyond the red into a space in which there are no luminous rays a maximum heating effect is produced. Again, the red and yellow rays are quite incapable of blackening photographic paper, whereas the blue and violet rays exert a rapid chemical action, and this is even exceeded by the invisible rays beyond the violet. It is evident then that (1) some of the solar rays which pass through the prism do not affect the retina; these rays are less refrangible than red light, or are more refrangible than violet; (2) the least refrangible solar rays possess most heating power; (3) the most refrangible rays are capable of exerting the most powerful chemical action. As glass prisms absorb many of the heat rays it is convenient to use prisms of rock-salt in examining the heat end of the spectrum. See FLUORESCENCE, RADIATION.

Until long after Newton's time it was supposed that the proofs of the rectilinear motion of light and of the laws of reflection and refraction are complete. It is now known that this is not the case. In the experimental proofs the source of light ought to be a mathematical point, hence deductions from observations of the rainbow cannot be accepted, as the sun is a large luminous body; deductions from observations of a star and of its reflection in a basin of mercury cannot be accepted, as they involve notions of the formation of an image in the eye, and assume the laws of geometrical optics; and again, if a diaphragm with a small aperture is placed in front of the object-glass of the theodolite, instead of an image of the star we see a number of coloured rings. It is well known that a horizontal ray of light passing through the atmosphere when this is arranged in horizontal layers of equal density will bend downwards (see MIRAGE); this is in direct antagonism to the laws on which geometrical optics depends. Young showed that two rays of light may destroy each other's effects and produce darkness; Grimaldi's experiment shows that rays of light may bend round obstacles. (See INTERFERENCE.) When a ray of light enters Iceland-spar it divides into two rays which travel in different directions; these two rays possess peculiar properties which are not exhibited by ordinary rays of light; they are said to be polarized. These polarized rays cannot be made to interfere or destroy each other's effects (Young's experiment mentioned above), but either of them may be divided into two interfering rays. These and other allied phenomena (see INTERFERENCE, UNDULATORY THEORY OF LIGHT, RADIATION, DYNAMIC THEORY OF HEAT, POLARIZED LIGHT) are accepted by physicists as proofs that (1) there exists throughout all space a very elastic medium of small density whose elasticity is less when entangled among the particles of a body than when in a vacuum; (2) the particles of all bodies are in a state of vibration; a rise in temperature of a body indicates an increase in the rapidity of vibration of its particles; (3) radiation of heat consists in the communication of these vibrations from the particles of a body by the ether to all parts space; (4) when these vibrations communicated by the ether become rapid enough they are able to affect the retina of the eye and are then called light; (5) lights differ in colour when their vibrations are not executed in equal times; (6) the vibrations of particles of the ether are all executed at right angles to the direction of propagation of the light; (7) in a ray of polarized light the vibrations are all executed at right angles to a certain plane called the plane of polarization; (8) the planes of polarization of the two rays in Iceland-spar mentioned above are at right angles to one another.

LIGHT, ABERRATION OF. See ABERRATION.

LIGHT CAVALRY, or HORSE. See CAVALRY.

LIGHTER, a large, open, flat-bottomed vessel, employed to carry goods to or from a ship.

LIGHTFOOT, JOHN, a learned English divine, born in Staffordshire in 1602, and received his education at Christ Church, Cambridge. He made considerable attainments in the Greek and Latin languages, and became curate of Norton-under-Hales. Sir Rowland Cotton made Mr. Lightfoot his chaplain, and took him into his house, where he applied himself to Hebrew with assiduity and success. In 1629 he printed his first work, entitled Erubhim, or Miscellanies, Christian and Judaical, which he dedicated to Sir Rowland Cotton, who presented him to the vicarage of Ashley, in Staffordshire. Here he resided until his appointment as one of the parliamentary assembly of divines rendered it necessary for him to remove to London. He warmly pressed the speedy settlement of the church in the Presbyterian form. In 1655 he became vice-chancellor of Cambridge, and zealously promoted the Polyglot Bible. After the Restoration he was appointed one of the assistants at the Savoy Conference, where he, however, attended but once or twice, giving all his attention

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to the completion of his work on the Harmonies of the Old and New Testament. He died Dec. 6, 1675. He was particularly distinguished by his knowledge of rabbinical literature, to which Gibbon and Hales bear witness; and Dr. Adam Clarke considered him the first of all English writers in Biblical criticism. His works consist of chronicles, annotations on the Scriptures, Jewish antiquities, &c. The best edition is that edited by the Rev. J. R. Pitman, thirteen vols. 8vo, London (1822–25), with a life of the author.

LIGHTHOUSES, beacons erected at the entrance of rivers and harbours, or on headlands overlooking the sea, and not unfrequently on solitary rocks, in the midst of a tempestuous ocean, at a considerable distance from land, to serve as a guide to the mariner in pursuing the proper track, or warn him of the hidden reef or precipitous shore to which he may be drifting. Their utility manifests itself at an early period in the history of society, and accordingly in as remote an epoch as that of Homer we find allusions to the lighting up of beacons on the shore to guide and cheer the sailor on his perilous course. The celebrated Colossus of Rhodes which stood at the entrance to the harbour of that city has been supposed by some to have served the purpose of a lighthouse, and is said to have held in its giant hand a chauffer of burning coals. The no less renowned Pharos of Alexandria, founded by King Ptolemy Philadelphus about 300 B.C., and which shared with the Colossus the rank of one of the seven wonders of the world, is the earliest building erected expressly as a lighthouse of which we have any authentic record. Our accounts of it are, however, extremely scanty, and furnish us with no means of ascertaining the nature of the structure or the method of illumination practised. It appears to have been a lofty tower placed at the entrance of the harbour of Alexandria, and in all probability served as a beacon by means of a great fire kindled on its summit. According to Josephus the light was visible at the distance of 40 miles. Some have imagined that the rays were diffused in the proper direction through the action of large mirrors, but for this conjecture there is no sufficient authority. All vestiges of the Pharos have now disappeared, and though it continued to exist down to the beginning of the fourteenth century no account has been left of the event which occasioned its destruction. Another celebrated lighthouse in ancient times was that of Capio or Apio, on the Spanish coast, described by Strabo as rivalling in magnificence the Pharos of Alexandria. Lighthouses are supposed to have been erected by the Romans at Holywell, Flamborough Head, Dover, and Boulogne, some remains of which still exist. In modern times the first important lighthouse erected was the Tour de Corduan, at the mouth of the Garonne in France, founded in 1584 and completed in 1610. It is 197 feet in height, and in architectural splendour surpasses all other lighthouses in the world. Nearly a century elapsed from the completion of the Tour de Corduan before the erection by Winstanley of the first of the series of lighthouses on the celebrated Eddystone Rock, in the English Channel (see EDDYSTONE), and upwards of another century before the foundation of the no less celebrated edifice on the Bell Rock, on the east coast of Scotland, was laid, under the superintendence of Mr. R. Stevenson. (See BELL ROCK.) The Eddystone Lighthouse has had to be rebuilt in consequence of the rock foundation giving way, the new structure being finished in 1882. Among other modern lighthouses deserving of notice are that of Skerryvore (which we shall shortly allude to more particularly), and the Dhu Heartach Lighthouse, both on the western coast of Scotland; the Wolf Rock Lighthouse at the entrance to the English Channel; that of the Bishop Rock off the Scilly Islands; and the Chicken's Rock Light south of the Isle of Man. In America the most noted is that of Minot's Ledge off the coast of Massachusetts, a granite structure completed in 1860 to take the place of a lighthouse of iron destroyed by storm in 1857.

As already mentioned the ancient method of illuminating lighthouses was simply by a coal or wood fire, and this primitive mode of lighting continued down to a comparatively recent date. Thus, in the Tour de Corduan the light was produced by burning oak billets in a chauffer on the top of the tower, and the subsequent introduction of the use of coal instead of wood was deemed a great improvement. A similar practice prevailed throughout Europe, and the advantages of a lighthouse were in consequence frequently rendered nugatory by the effect of wind and rain and the impossibility of distinguishing one light from another. In the Eddystone Lighthouse up to the commencement of the present century the only light afforded was that issuing from a chandelier of tallow candles. An immense improvement in lighting was made a few years previous to the French revolution by the introduction at the Tour de Corduan of the use of parabolic reflectors, which concentrate and throw forward in a horizontal direction the rays of light proceeding from lamps placed in their foci. A dispute exists in regard to the originator of this idea, the merit of its conception being attributed by some to M. Teulère, a member of the royal corps of engineers of bridges and roads in France, and by others to the Chevalier Borda. At the same time the revolving frame was introduced, which has proved of the greatest utility in establishing a distinction between lights. The reflectors are composed of sheet-copper plated with silver, and formed into a parabolic curve by a laborious and delicate process. This mode of lighting is termed the *catoptric* or *reflecting* system, and was rapidly adopted in Britain after its first employment in France. It is so called in opposition to the *dioptric* or *refracting* system, in which the illumination is produced by a central lamp, the rays from which are transmitted through a combination of lenses by which it is surrounded. The adoption of lenses in lighthouses, though suggested as far back as the middle of the last century, was first carried into practical effect in 1788 by M. Augustin Fresnel, a distinguished French savant. The superior advantages which this system has been found to possess over that of reflectors has led to its general adoption in most lighthouses. Fresnel likewise contrived a combination of the two systems, the apparatus in which consists of thirteen rings of glass of various diameters, arranged one above another in an oval form. The five middle rings form a cylindric lens through which the rays from the central lamp are transmitted by *refraction*, while the other rings or prisms, five of which are upper and three lower, are constructed in such a manner as to project by *reflection* the light from the focus in a direction parallel with the refracted rays. The light thus obtained is termed the *catadioptric* light. A modification of the dioptric and catadioptric systems, so as still further to prevent the loss of the rays of light, and thereby increase the intensity of their resultant beam, has been introduced by Mr. Thomas Stevenson under the designation of the *holophotal* system, its object being to effect the useful application of the *whole* of the light. Sometimes, as in lighthouses erected in tortuous channels, particular arrangements of prisms and lenses are employed to direct the greater part of the light in particular directions.

Rough weather may prevent approach to an isolated lighthouse for a number of months, and it must therefore contain oil, &c., to last for a considerable length

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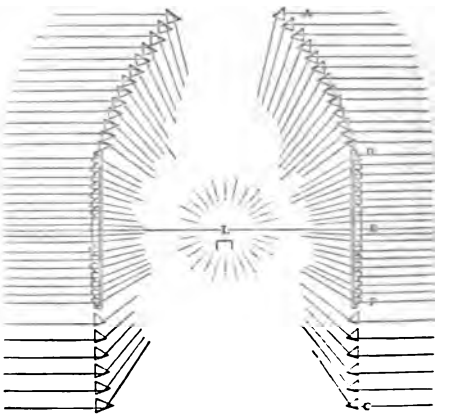
of time as well as provisions for three light keepers. The light must be at a proper elevation above the sea; this is considerable when the lighthouse is surrounded by much foul ground, and care is taken to have the building strong enough to resist the beating of waves, which are often so large as to send spray over the lantern. When the lighthouse is built on a large island or on the mainland it has dwelling-houses attached for the families of the light keepers.

A sectional view of the Skerryvore Lighthouse is given in Plate CXV. This building, situated on the Skerryvore Rocks, about 12 miles W.S.W. from the seaward point of the Island of Tyree, Argyllshire, was commenced in 1838, and completed as far as regards the mason-work in 1842, under the superintendence of Mr. Alan Stevenson, who has given in his published account a graphic description of the perils and difficulties attending its erection. It is 138 feet 6 inches in height, with a diameter of 42 feet at the base and 16 at the top, and contains 58,580 cubic feet of masonry, or about 4308 tons. Plate CXVI. exhibits an illustration of the various systems of lighting. The apparatus used in the catoptric or reflecting system is shown in figs. 1, 2, and 3, *a*, *a*, *a* representing the external or convex side of the reflector or mirror, in the interior or concavity of which the burner *b* of an argand lamp is placed. Two apertures cut respectively in the lower and upper parts of the reflector serve, the lower for the insertion of the burner, the upper for ventilation, having likewise attached to it the copper tube *h*. The burner *b*, with its fountain of oil *c* and connecting pipe, is mounted on a rectangular frame *d d*, which is movable in a vertical direction upon the guide-rods *e* and *f*, and by turning the handle *g*, as seen in fig. 2, the burner may be lowered and removed for the purpose of cleaning from the interior of the reflector without the necessity of displacing the latter; *i* shows a cross section of the main bar of the frame on which the reflectors are ranged, each resting on knobs of brass, one of which is seen at *k k*, and which are soldered on the brass band *l* that clasps the exterior of the reflector. Fig. 1 is a section of the reflector *a a*, showing the position of the burner *b* with the glass-chimney *b'* and oil-cup *l*, which receives any oil that may drop from the lamp. In fig. 3 the fountain *c* is moved partly down; *d d* shows the rectangular frame on which the burner is mounted, *e e*, the elongated socket-guides through which the guide-rods slide, and *f* the guide-rod connected with the perforated sockets on which the checking-handle *g* slides. An elevation and plan of the revolving catoptric frame are shown in figs. 4 and 5, *n n* being the frame or chandelier, *o o* the reflectors with their oil-fountains, *p p* and *q* the revolving axis or shaft to which the whole is attached. The copper tubes *r r* convey the smoke from the lamps; *s s* are cross bars which support the shaft at *t t*; *u u* is a copper pan for receiving any moisture which may accidentally enter at the central ventilator in the roof of the light room; *l* is a cast-iron bracket supporting the cup in which the pivot of the shaft turns; *m m* are bevelled wheels which convey motion from the machine to the shaft. The machinery by which the apparatus revolves resembles that of ordinary clock-work, being moved by the descent of a weight. Fig. 6 exhibits a revolving dioptric apparatus of the first order; F is the focal point in which the flame is placed; L L great annular lenses forming by their union an octagonal prism with the lamp in its axis; L' L' the upper lenses, above which plane mirrors M M are placed so as to project the rays reflected from them in a parallel direction to the horizon; and Z Z are the lower zones, which collect and project by reflection the light which would otherwise escape below the lenses. The lower part of the figure shows the movable framework which carries the lenses and mirrors, the rollers on which it circulates, and the clockwork which gives motion to the whole. Fig. 7 represents a fixed catadioptric light of the first order. A B C and A'B'C' are respectively the upper and lower zones which supply the place of the mirrors M M in fig. 6, and D E F is the cylindric refracting belt.

The accompanying figure is a section showing the paths of rays of light from the central part of L; D F acts as a convex lens whose focus is at L; the prisms A D subject the rays to total reflection, so that nearly



all the light leaving L is sent out from the lantern in parallel rays. As the flame at L is of some size the rays really have a considerable amount of divergence, and the light may be seen from places at very different distances away.

Floating Lights are those employed on sandbanks or shoals, where the ground is too soft to bear the structure of a stone and the water too deep to permit the erection of a screw-pile lighthouse. A vessel is moored off the spot, and octagonal lanterns fitted with argand lamps placed in the foci of parabolic reflectors are hoisted on the masts. They serve as guides to the entrance of estuaries or in piloting the way through channels, but are both less efficient than land lights, and maintained at a much greater expense.

In order to extend the utility of lighthouses, and enable them to serve more certainly as landmarks to the mariner, various modes of exhibiting the light have been introduced so as to establish a distinction between that of different places.

In the British charts lighthouses are marked by one or other of the symbols *F*, *Fl*, *F* and *Fl*, *Rev. Int*, *Alt*, where *F* means *fixed* or steady; *Fl*, *flashing*, showing five or more flashes and eclipses alternately in a minute; *F* and *Fl*, a *fixed* light, with a white or red *flash* in addition (preceded and followed by a short eclipse), at intervals of two, three, or four minutes; *Rev*, *revolving*, the light gradually increasing to full effect and gradually decreasing to eclipse at equal intervals of one, two, or three minutes, but occasionally as often as three times in a minute; *Int*, *intermittent*, suddenly appearing in view, remaining visible for a certain time and then as suddenly eclipsed for a shorter time (this is effected by the perpendicular motion of shades placed in front of the reflectors so as to alternately display and conceal the light); *Alt*, *alternate*, red and white lights at equal intervals without any intervening eclipse. A large majority of the lights of the British Islands are fixed, a considerable number are revolving; and only a small proportion belong to any of the other de-

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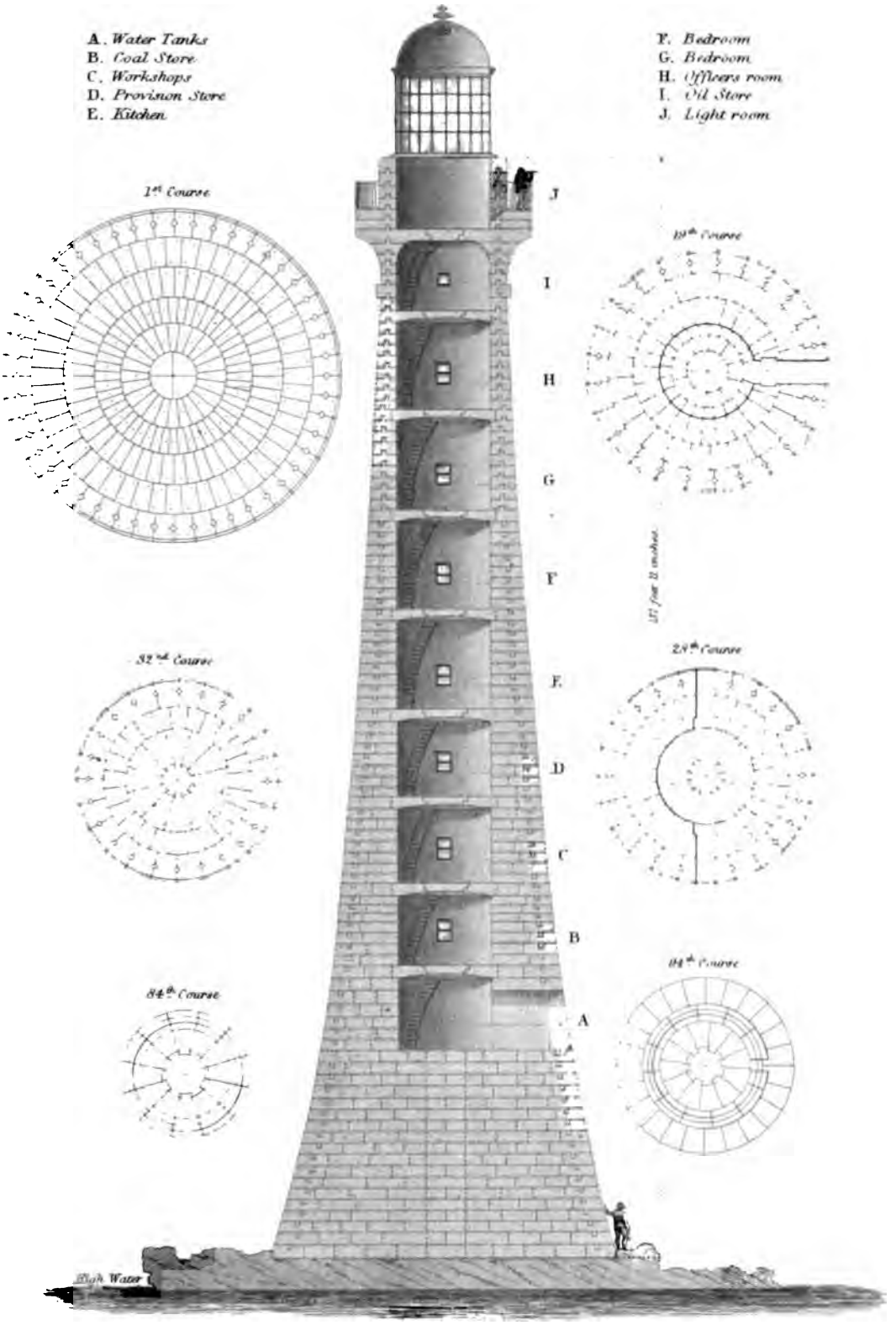
LIGHT HOUSE.

PLATE CXV.

SECTIONAL VIEW OF SKERRYVORE LIGHTHOUSE.



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LIGHT HOUSE.

LIGHTING APPARATUS.

Fig 1.

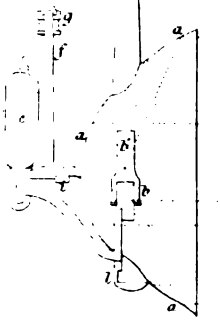


Fig 3.

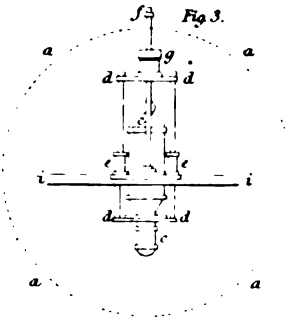


Fig 2.

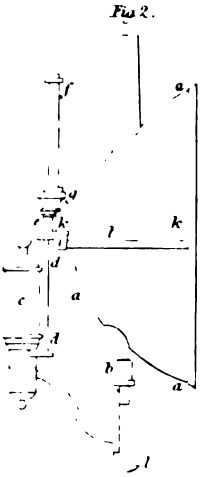


Fig. 4.

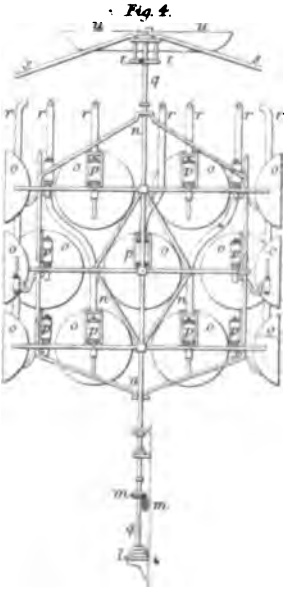


Fig 6.

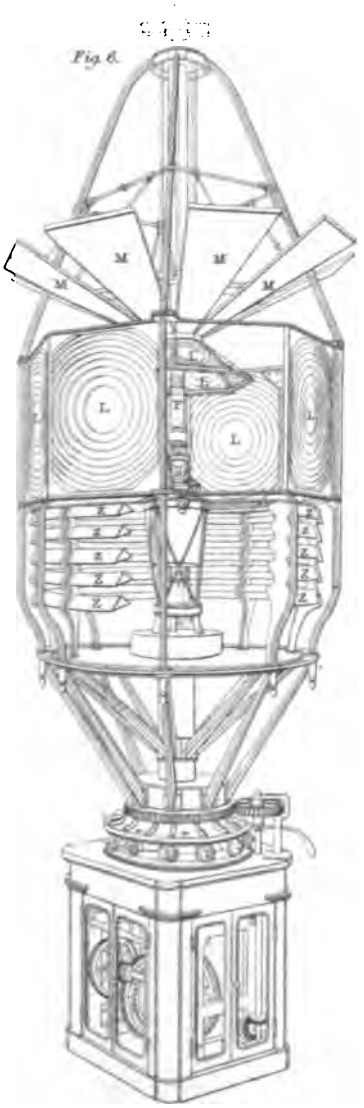


Fig 7.

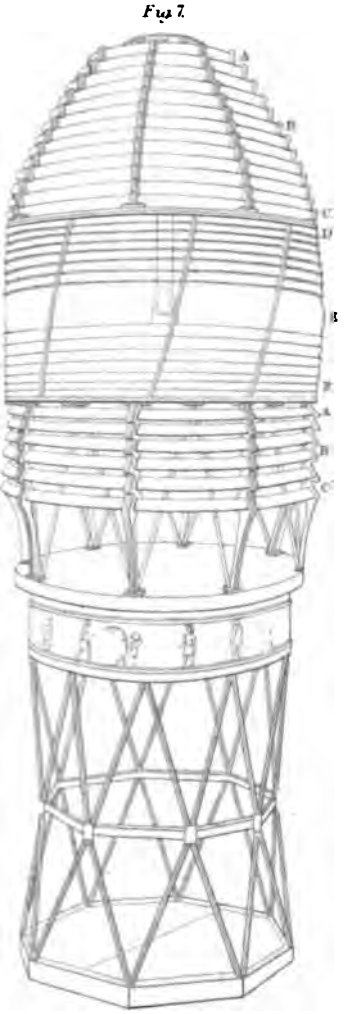
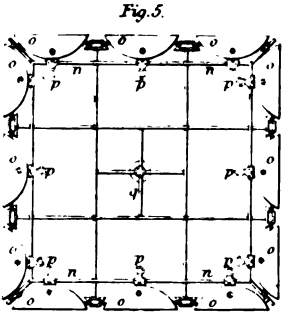


Fig. 5.



Revolving Dioptric Apparatus
First Order.
actual height 23 feet.

Eng^d by Tho^s Duck

Fixed Catadioptric Light
First Order
actual height 18 feet 2 inches.

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scriptions, *Fl*, *F* and *Fl*, *Int*, or *Alt*. A majority of the revolving lights have a period of one minute; very few less than one minute; some as long as three minutes. Somewhat similar designations are adopted for distinction in America.

The difficulty of observing lights and of distinguishing between different lighthouses on rough rainy nights at sea, especially when the lights flash out at long intervals, has caused a number of wrecks; it is supposed that flashes and eclipses at intervals of less than two seconds will be much more likely to attract attention, and will afford an easy means of recognition of a particular light. The flashes and eclipses may be long (one and a half second) or short (half a second); each lighthouse will have a peculiar combination of long and short flashes and eclipses. Thus if the combination *f e F E* (*F* and *f* mean long and short flashes, *E* and *e* mean long and short eclipses) is continually repeated by a lighthouse it will be readily distinguished from another whose combination is *F e f e f E* or *f e F e f E*, and it will be more likely to attract attention on a rainy night than even a fixed light.

Oil is commonly employed at present, and it is likely to remain in use in isolated lighthouses. Sperm-oil and colza-oil have been much made use of, but latterly mineral oil (paraffin) has been found very suitable, being cleanly, easily lighted, and cheap. It is accordingly now extensively employed. The necessary combinations of flashes and eclipses may be produced by causing a number of shades fixed to a frame to rotate before the light by means of clock-work. This system has been adopted for the Holywood light in Belfast Lough. Judging from the reports of Dr. Tyndall it is likely that *gas* will be substituted for oil in many lighthouses; with gas an eclipse can be simply produced by a partial stoppage in the supply pipes, and there is no such waste of light as when oil is employed. A burner for gas has been invented by Mr. J. R. Wigham which presents a total of 108 jets arranged in concentric circles. Only in the dullest states of the atmosphere are the whole 108 lighted, at other times 88, 68, 48, or 28 (the lowest number) according to the weather. Gas has been successfully employed in illuminating buoys for the guidance of vessels. The buoys (which, of course, are gas and water-tight) are charged to a pressure of perhaps ten atmospheres, giving a continuous light for three or four months. In all lighthouses the oil and gas burners are changed in foggy weather to give more luminous flames. As a lighthouse illuminant the electric light, though having certain alleged defects, has been adopted for a number of lighthouses on the coasts of France and elsewhere.

By the 389th section of the Merchant Shipping Act (1854) all the lighthouses, buoys, and beacons of the United Kingdom are put under the superintendence and management of three different bodies. Those of England, Wales, and the Channel Islands, and the adjacent seas and islands, besides those of Heligoland and Gibraltar, are placed under Trinity House; those of Scotland, the Isle of Man, and the adjacent seas and islands, under the Commissioners for Northern Lighthouses, consisting of the lord-advocate, the solicitor-general, the lord-provost of Edinburgh, the lord-provost of Glasgow, the eldest bailies of Edinburgh and Glasgow, besides the provosts of the chief ports, and the sheriffs of most of the maritime counties of Scotland; and those of Ireland and the adjacent seas and islands under the Port of Dublin Incorporation. Trinity House may, however, inspect lighthouses in Scotland and Ireland; and the Board of Trade may also appoint persons to inspect lighthouses, and may require returns to be made by the lighthouse authorities of the three kingdoms as to the conditions of the lighthouses, buoys, and beacons within their jurisdiction. The same act provides for the regulation of light-dues, which may be altered by the general lighthouse authorities with the consent of the queen in council; and empowers the lighthouse authorities to construct new lighthouses, under the condition that the Commissioners of Northern Lighthouses and the Port of Dublin Incorporation must have the sanction of Trinity House or the Board of Trade before erecting any new lighthouses within their jurisdiction. The dues to be taken for new lighthouses are to be fixed by the Queen by order in council; and the first section of act 18 and 19 Vict. cap. xci. provide for the dues to be taken for colonial lighthouses being fixed in the same way, although such dues are not to be levied without the consent of the colonial legislature. Any fire or light which is liable to be mistaken for a light proceeding from a lighthouse must be extinguished by the owner on receiving notice to do so from the lighthouse authorities. In the United States the lighthouses are under the Lighthouse Board, which has charge of all buoys, beacons, &c., on the coasts and waters of the States. It consists of two naval officers, two officers of engineers, two civilians with a special knowledge of science, and two secretaries, the secretary of the treasury being president.

LIGHTNING, the spark or flash observed during a sudden discharge of atmospheric electricity. It may be (1) a diffused reddish white or violet flash, seemingly spread over a considerable extent of the sky; perhaps it is due to a discharge inside the cloud, the light suffering reflection and diffusion. The colour of the lightning varies with the state of the atmosphere; in elevated regions, where the air is rare, the spark has a violet tint; (2) a zigzag line of light; the path taken by the electricity in a discharge between two clouds or between a cloud and the earth is distinctly seen to be made up of straight lines and sudden bends; it resembles the discharge from the prime conductors of an electric machine; it is the path of least resistance, and seems to start from the positively electrified body; the light is white and very brilliant; (3) heat lightning, as it is called; it is unlike (1) and (2) in being unaccompanied by thunder; it seems to be the reflection from aqueous vapour and clouds of a discharge occurring beyond the horizon, or it may be due to a discharge at such a great elevation in the atmosphere that the thunder cannot be heard. Sometimes during a thunderstorm *fire-balls* are seen; no exact observations of them have yet been made; they are said to fall slowly (in about ten seconds) from the clouds to the earth, often rebounding once or twice and exploding violently; it seems difficult to explain them on the supposition that they are of electrical origin. When the light of a lamp illuminates a rapidly-moving carriage wheel the spokes cannot be distinguished; this is due to the impression of an image on the retina of the eye lasting for $\frac{1}{10}$ of a second (see PERSISTENCE); when the wheel is illuminated by a lightning flash it appears to be motionless, therefore there is no perceptible motion during the time of the flash. Experiments with a revolving disk with black and white sectors show that a flash of lightning certainly does not last longer than $\frac{1}{100000}$ of a second. Water is a good conductor, dry air a bad conductor of electricity; clouds consist of particles of water; these particles seem to owe their electricity partly to evaporation and the friction produced by winds and partly to other causes; their electricity is *generally* positive (see METEOROLOGY); the internal particles discharge into one another when they get condensed enough until the electricity reaches the outer parts of the cloud. The *spectrum* of lightning shows the

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presence of incandescent nitrogen, oxygen, hydrogen, and sodium. It may be one or other of two species, according to the intensity of the discharge. If an unelectrified cloud comes near an electrified one, and if the first now lets rain fall the rain may carry off electricity and leave the cloud electrified. (See ELECTRICITY.) When the clouds get closer, or when one of them approaches the ground, a discharge takes place. Certain electroscopic experiments seem to show that previous to a discharge between two clouds internal discharges are taking place in both. Lightning in passing through air and non-conductors, metallic rods, &c., exhibits all the phenomena of the passage of a very great quantity of electricity; it kills animals, splits trees and stones, and melts thin wires. Prominent objects, buildings, trees, &c., afford a passage for the electricity, and if they are bad conductors they may be destroyed; hence lightning-rods are elevated above buildings for their protection. (See CONDUCTOR, LIGHTNING.) Sometimes on entering the earth the lightning melts the silicious substances, in its way producing the tubes called *fulgurites*. It possesses the power of magnetizing iron and steel bars, and sometimes inverts the poles of magnetic needles. (See ELECTRO-MAGNETISM.) After a lightning discharge the peculiar odour of ozone may be observed, as in the neighbourhood of an electric machine. Objects at a distance from a place of discharge may have previously been charged with electricity by the induction of the clouds; the distant discharge suddenly sets free this electricity so that it passes through the objects to the ground, producing what has been called *the return shock;* men and animals have often been killed in this way. If sparks are drawn from an electric machine when a frog is near, the frog experiences shocks of this kind.

Thunder is a sound due to the sudden disturbance of the air produced by a lightning discharge; the long rolling effect is perhaps due to echoes from the clouds, perhaps partly to there being a number of discharges at different distances from the observer. Sound travels at about 1100 feet per second, whilst the passage of light is almost instantaneous, therefore the thunder is heard some time after the flash is seen. The interval in seconds divided by 5 or 4·8 gives the distance to the place of discharge approximately in miles.

LIGHTNING-ROD. See CONDUCTOR.

LIGHTS, in public worship. Light in Scripture is frequently referred to as a symbol of the Divine Presence, and in the ceremonial worship of the Jews it was ordained that a golden candlestick or lamp with seven branches should be kept burning continually beside the altar of incense in the tabernacle, and afterwards in the temple. A reference is evidently made to this usage in the seven golden candlesticks of the Apocalypse. Ritualists are also of opinion that in the reference (Acts xx. 8) to the many lights in the upper chamber where the disciples were gathered together at Troas there is a proof of the symbolical use of light in the early church. It appears at all events that this usage had become established by the fourth century. St. Jerome says, 'Throughout the churches of the East, when the Gospel is read, candles are lighted although the sun be shining, not for the purpose of driving away darkness, but as an outward sign of gladness.' These were called gospel lights. In the Sacramentaries of St. Gregory (A.D. 590) it is directed that at two o'clock in the afternoon of Christmas Eve the ceremonies of the baptismal office shall begin with the lighting of two tapers, which are to be held at each horn of the altar by readers during the reading of the appointed eight lessons from Holy Scripture. The taper-bearers preceded the procession of the clergy to the font, and when the bishop blessed the water he held one of the tapers in it. Lights were also burned round the tombs of the martyrs in their festivals. This ceremony was forbidden to be practised in cemeteries by the Council of Elvira, A.D. 325, but it was continued in the churches not only for the persons buried within their walls, but for all who made provision for its observance on the anniversary of their deaths. The Feast of the Purification was popularly called Candlemas, on account of the numerous lights employed in its ceremonies. Funeral lights were carried in procession in the time of Gregory of Nazianzen. The origin of eucharistic lights, or lights burned during the celebration of the eucharist, cannot probably now be traced. In the Roman Catholic Church lights are kept burning during the whole time of the celebration of mass. Ritualists assert that eucharistic lights have been used from the time of the apostles, but of this there is no direct proof. Candlesticks, and sometimes candles, are still retained on the altar in English churches, but they are not lighted for ceremonial purposes except by the ritualists.

LIGNITE, a partially carbonized fossil wood, retaining its woody fibre, and intermediate in its qualities between peat and coal. It is found in the secondary and tertiary strata, but chiefly in the latter. There are various kinds of it, differing in the degrees in which they approximate to a mineral or vegetable structure, as jet, the most compact, moor coal, Cologne earth, basaltic coal, brown coal, &c. It occurs in considerable beds, and in some districts is used as a substitute for coal. It sometimes contains as much as 45 per cent. of water, which evaporates on exposure to the air, and forms a bad fuel. It is found in France, in the departments of the Isère and the Ain, in beds of 10 feet in thickness, and in the department of Bouches-du-Rhone, where it is excavated in large quantities; in Germany in the duchy of Nassau on the Rhine and in Styria; in Switzerland, and in England and Scotland. The plants found in lignite are all terrestrial.

LIGNUMVITÆ. See GUAIACUM.

LIGNY, BATTLE OF, June 16, 1815. See QUATRE-BRAS and WATERLOO.

LIGUORI, ALPHONSO MARIA DE, founder of the sect called *Ligorists* or *Redemptorists*, was born at Naples Sept. 26, 1696. He was originally a lawyer, but some unpleasant circumstances in his profession induced him to become a priest in 1722. He soon joined the Congregation for the Propagation of the Faith, which had been instituted in Naples, and occupied himself as a missionary in the instruction of the ignorant peasantry. In 1732 he founded a monastery in the hermitage of St. Mary at Villa Scala (in the Principato Citra) with the approbation of the pope, the members of which were called the *Order of the Most Holy Redeemer*, and were to be employed in the instruction of the people. This order was approved of by Pope Benedict XIV. in 1749, and rapidly extended in Italy, Germany, Spain, and France. Liguori was in 1762 appointed bishop of Santa Agata de' Gotici (in the Principato Ultra) by Clement XIII., from which office he was released by Pius VI. in 1775, at his own request, being old, sickly, and so exhausted by fasting and penance that he was no longer able to perform the duties of his office. He retired to the chief foundation of his order at Nocera de' Pagani, and died there Aug. 1, 1787, at the advanced age of ninety years. Since 1816 his name has been enrolled in the Romish calendar of saints. His writings, which are of an ascetic character, have appeared partly at Naples and partly at Venice.

LIGURIA, with the Greeks and Romans, was that portion of the north of Italy extending along the

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Mediterranean from the frontiers of Gallia Cisalpina to those of Etruria, bounded on the north by the Po, east by the Macra, and west by the Varus. These were its limits at the time of Augustus, but at an earlier period it extended to the borders of Gaul, or even to the mouths of the Rhone. In 1797 the aristocratic Republic of Genoa received from Bonaparte a democratic constitution, under the appellation of the *Ligurian Republic*. This republic ceased to exist in 1805, when the emperor incorporated it with France. After 1814 it formed part of the Kingdom of Sardinia, and now of that of Italy, in which it comprises the provinces of Genoa and Porto Maurizio; area 2056 square miles; pop. (1881), 893,027.

LILAC (*Syringa vulgaris*, nat. order Oleaceæ), a familiar ornament of our gardens, is a native of Persia, and is allied to the olive, the privet, and the ash. The plant possesses febrifugal qualities. The English name of the genus is from *lilag*, the Persian word for the flower. The name Syringa is derived from the Greek word for a pipe, because when the pith is extracted from the wood it forms pipes like those which Pan made of the reeds into which the nymph Syrinx was transformed. The lilac was therefore called the pipe-tree when it was first introduced into this country 300 years since.

LILLE, an important town of France, capital of the department of the Nord and chief fortress of the north of France, 127 miles north of Paris. It is remarkably well-built; has spacious, regular streets, lined with large, massive houses of brick, or the calcareous stone of the neighbourhood, and generally with handsome fronts, two or three stories high. Lille is surrounded with walls, and regularly fortified, ranking as a fortress of the first class. The citadel, in the form of a regular pentagon, with all the accessories of defence, including the means of inundation, is regarded as a master-piece of Vauban. The Haute and Basse Deule, sluggish streams, traverse the town, and are connected by a canal; while the country around is so flat that for about 1½ mile it can be laid under water. Compared with the size and importance of the town its public buildings are of little note. The most remarkable are, the Church of St. Maurice, said to date from 1022, but from the style of its Gothic apparently later; the Church of St. Paul; the Palace of Rihour, built by Jean-sans-Peur, 1430, and now chiefly occupied by municipal and law courts, but partly appropriated as a school of art, and containing a fine collection of paintings by old masters; the Mont-de-Piété; the Paris Gate, a triumphal arch in honour of Louis XIV.; the general hospital, a noble building, endowed for old men and children; the theatre, adorned with a Doric colonnade; the music-hall, one of the finest in France; and the museum, occupying the extensive buildings of an ancient convent, and containing a valuable library, a picture-gallery, and a chartulary. Lille possesses courts of first resort and commerce, a society of arts and sciences, a royal academy of music, an academical school, a communal college, a school of painting, a botanical garden, &c. The manufactures are numerous and extensive, and some of them have long enjoyed a high reputation. One of the oldest and most important is fine linen thread for lace, tulle, and gauze, together with all kinds of linen and cotton twist for general purposes. The other manufactures are broad-cloth, bed-covers, camlet, cotton, silk, and woollen stuffs of all sorts; moleskins, bed and table linen, carpets, hats, carriages, paper, beet-root sugar, raw and refined; soap, glue, ribbons, and tulles, which try to rival those of England. The preparation of oil is carried on to a great extent. Lille has also tobacco factories, works for making Prussian blue and white-lead, engine-works, iron and brass foundries, dye-works, bleachfields, numerous breweries, and gin and brandy distilleries. The agricultural district of which it is the centre produces beet-root, oleaginous grains, linen, tobacco, &c. Its situation on the frontier, and extensive railway and water communication, make Lille a great entrepôt for general goods, and also colonial produce, which reach it from the ports of Dunkirk, Calais, Boulogne, and even Havre. Its trade, extending directly or indirectly to almost every country of Europe, consists of linens and linen thread, lace, cotton twist, printed woollens, tobacco, madder, coffee, spices, wine, brandy, gin, hops, wax, coal, oil, &c.

Lille, formerly the capital of French Flanders, is said to owe its origin to a strong castle built towards the downfall of the Roman Empire, and called from its position *Insula*—hence L'isle, easily changed to Lille. In 1007 Baldwin IV. extended it, and in 1030 surrounded it with walls and ditches. From that time, but not without many vicissitudes, Lille has continued to increase, passing through the hands of various masters. In 1476 it passed to the house of Austria, and twenty years later to the Spanish branch, which retained it for two centuries. On 27th August, 1667, it was taken by the French after a short siege by Turenne and Vauban, who fortified it anew. It was taken after a siege of several months by Eugene and Marlborough, on 23d October, 1708; the citadel did not capitulate till 7th December; it was ceded to France by the Peace of Utrecht in 1713. In 1792 it was ineffectually besieged and bombarded by the Austrians. Pop. (1881), 178,144.

LILLO, GEORGE, an English tragic poet, born 1693, in London. He was by trade a jeweller, but notwithstanding his attention to business he dedicated a considerable portion of his time to the cultivation of the drama. Fielding, the author of Tom Jones, himself a dramatist, and the contemporary and personal friend of Lillo, bears strong testimony to the integrity of his heart, as well as to the excellence of his social qualities. An edition of his plays was published in 1775 by Davies in two vols. 12mo. The principal are, George Barnwell, or the London 'Prentice, a tragedy founded on an incident in domestic life said to have taken place at Camberwell (this play used to be regularly represented on lord-mayor's day); Fatal Curiosity, also said to be founded in fact; Arden of Feversham, which was certainly so; and Elmeric. He died in 1739.

LILLY, LILY, or LYLY, JOHN, a dramatic and miscellaneous writer, born about 1553, studied at Oxford and Cambridge. He wrote nine dramatic pieces which are now forgotten. He attempted to reform and purify the English language in two fantastic romances entitled Euphues and his Anatomy of Wit (1580), and Euphues and his England (1581), which met with great success. A specimen of Euphuism may be seen in the character of Sir Piercie Shafton in the Monastery of Sir Walter Scott. Lilly was also the author of a famous pamphlet against Martin Marprelate and his party, entitled Pappe with a Hatchet, published about 1589, and attributed to Nashe.

LILLY, WILLIAM, a famous English astrologer, born at Diseworth in Leicestershire in 1602, went early to London, where his necessities obliged him to article himself as servant to a mantua-maker in St. Clement Danes. In 1624 he became book-keeper to a tradesman who could not write, on whose death he married his widow, with a fortune of £1000. In 1632 he turned his attention to astrology, and he gave the public a specimen of his skill by an assurance in 1633 that the king had chosen an unlucky horoscope for his coronation in Scotland. About this time he procured a manuscript copy of a book by

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Cornelius Agrippa, entitled Ars notoria, from which he imbibed the doctrine of the magic circle and invocation of demons. In the same year (1634) he was allowed by the Dean of Westminster to assist David Ramsay, the king's clock-maker, in search of a hidden treasure in Westminster Abbey, another associate being found in one John Scot, who pretended to understand the mystery of miners' divining-rods. These three worthies accordingly made the experiment on the night appointed, and after digging up a coffin to no purpose, they were frightened from the place by a violent storm, which Lilly in the sequel attributed to demons, whom he had found means to dismiss. In 1644 he published his Merlinus Anglicus, which he continued annually until his death. Having acquired the friendship of Bulstrode Whitlock, he devoted himself to the interests of the Parliament, although he occasionally continued his predictions, in order the more easily to impose on the credulity of the age. In the year 1648 Lilly and Booker, another astrologer, were sent to the camp at Colchester to encourage the soldiers by their predictions; and such was his reputation that he was rewarded for his various services (one of which was obtaining secret intelligence from France) with a pension of £100 per annum. About this time he read public lectures on astrology, and succeeded so well that he was enabled to lay out £2000 in fee-farm rents at Horsham. In 1659, such was the spirit of the age, he received the present of a golden chain from the King of Sweden, whom he had mentioned with great respect in his almanac. On the Restoration Lilly was taken into custody by order of Parliament as one of the depositaries of the secrets of the republicans, and examined concerning the persons who beheaded the king, when he declared that he had been informed that Cornet Joyce acted as the executioner. A short time after he sued out his pardon under the great seal, and retired to Horsham. In 1666 some of the members, suspecting from the hieroglyphic to his almanac that he might know something of the causes of the great fire which followed its publication, had him sent for to a committee of inquiry, when he asserted that he had certainly foreseen the event, but could say nothing as to the cause. His History of his Life and Times is a very entertaining production, steering as he does between truth and falsehood, and seldom indulging in more of the latter than is necessary to support his character as an astrologer. He died at Horsham, 9th June, 1681.

LILY, a beautiful genus of plants belonging to the natural order of Liliaceæ. The root is a scaly bulb; the leaves simple, scattered, or verticillate; the stem herbaceous, simple, and bearing at the summit very large and elegantly-formed flowers. The flower consists of six petaloid sepals, the calyx and corolla being alike in form and colour. Paxton names thirty-four species, including a number of varieties of lilies cultivated in this country. The finest American species is the *L. superbum*, which grows in marshes to the height of 6 or 8 feet, bearing reflexed orange flowers spotted with black. The lily has always held a prominent place in emblematic language. In the middle ages and in modern times the white lily has been the emblem of chastity. Hence the Virgin Mary is often represented with a lily in her hand or by her side. Garcias, the sixth King of Navarre, established an order of the Lily in 1048, in honour of the Virgin, because her picture had been found on a lily at Nogera, the royal residence. In the beginning of the fifteenth century Ferdinand I. of Arragon founded an order of the Lily. When the Count d'Artois, afterwards Charles X., entered France in 1814 the lily became a party emblem, replacing the *fleur-de-lis*. The adherents of the Bourbons wore a lily in the button-hole, suspended by a white riband. The French government subsequently distributed them with much profusion on various occasions, as to pupils who appeared well at public examinations. After the battle of Waterloo Louis XVIII. offered Blücher to give the lily to every Prussian soldier, but he declined the honour. During the revolution of 1830 the lily was not attacked, as the memory of Louis XVIII. was respected; but when the Carlists publicly celebrated the day of baptism of the Duke of Bordeaux, the people, indignant at such a scene, destroyed the lily wherever it could be found. The government (Casimir Perrier being prime minister) ordered all the crosses and the lilies to be removed from the public edifices, &c., though it had just before been in contemplation to introduce the *fleurs-de-lis* upon the tricolored banners.

LILYBÆUM, the name given by the ancients to the most western promontory of Sicily, now Cape Bœo, not far from the town of Marsala, and about 60 miles distant from Cape Bon, the nearest point in Africa. The Carthaginians, about B.C. 350, founded here a town of same name, which was chiefly inhabited by Greeks, was strongly fortified, and had an excellent harbour, which became the principal naval station of the Carthaginians in Sicily. They were obliged to cede it to the Romans (B.C. 241) at the end of the first Punic war.

LILY-OF-THE-VALLEY (*Convallaria Maialis*), a plant of the natural order Liliaceæ, distinguished for its beautiful bell-shaped flowers. It is found in Europe, Asia, and North America. The flowers, generally white, are hermaphrodite, forming a terminal unilateral raceme on a curved stalk; the perianth is six-cleft; the ovary three-celled, with two ovules in each cell. Its odour is agreeable, and when dried it is used as a sternutatory, and the French distil from it an anodyne water called *eau d'or*.

LIMA, the capital of Peru, situated at the foot of granitic hills, 7 miles from Callao, its port on the Pacific, on both banks of the Rimac, which divides it into two unequal portions, connected by a handsome stone bridge of six arches, and 530 feet in length. The streets are equidistant, intersect each other at right angles, and have an average breadth of 34 feet. They are not very well paved, though considerable improvement has been effected in this respect. Many of them have a stream of water running down the centre. The numerous domes and spires give Lima a fine appearance from a distance. The grand square, the Plaza Mayor, is the central point of its life and business, together with the adjoining streets. This fine square is a regular quadrangle, each side of which is 510 feet long, having in the centre a magnificent bronze fountain with three basins; two sides are occupied by the portales or piazzas, the most attractive places in Lima for a stranger. They are about 500 feet long, well paved with small stones interlaid with the knuckle-bones of sheep, which produce a kind of mosaic pavement. In these portales all kinds of dry goods and fancy articles are sold. On the north side of the square stand the palace and offices of the government, a square building of mean aspect, once the property and residence of Pizarro; on the east the bishop's palace and the cathedral, and on the west the senate-house, the town-hall, and a row of shabby houses. The next public square in respect of size is the Square of the Inquisition, now called the Square of Independence, in which stand the hall of the congress, the jail, and the Palace of the Inquisition, where cruelties were practised no less terrible, and perhaps in hardly fewer instances, than in those of

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the Inquisition of Madrid. Among the numerous churches and convents a few only are deserving of particular notice; of these the cathedral is the most remarkable. It is richly decorated within, and beneath its grand altar lie the remains of Francisco Pizarro. The convent of San Francisco is the largest monastic establishment in Lima, occupying nearly 7 acres of ground; it is an elegant structure, now out of repair, and exhibiting evident signs of decay. The monasteries and convents, at one time very numerous, have to a great extent been suppressed. The university, once the most important, as it was the first established seat of education of the kind in the New World, has connected with it a national library of about 20,000 vols., and the museum, in which are collections of Peruvian antiquities and objects of natural history. There are also a college of advocates; a college of pharmacy, with a botanic garden attached; another of medicine and anatomy; and various other educational institutions. There are likewise a number of well-conducted hospitals, including one for foundlings and two for lunatics. The places of public amusement are three alamedas or promenades—the Vieja or Old Alameda; the Alameda de Acho, on the banks of the Rimac, containing the bull-ring, capable of accommodating 10,000 to 12,000 spectators, and formerly the scene of the *autos-de-fé* of the Inquisition; and the Portada del Callao; two theatres, and an amphitheatre for cock-fights, and several small saloons for dancing. Lima has several manufactories of gold-lace and fringes, and a manufactory of glass, of cotton, of chocolate, and of paper, &c.; but nearly all the goods sold and consumed in the country are foreign. It has a considerable foreign trade through its port Callao, which is connected with it by a railway. The climate of Lima is very agreeable, rather relaxing to the young, but highly favourable to the middle-aged and elderly. The range of the thermometer throughout the year is from 73° to 75° in winter, and 86° to 87° in summer. Lima is very subject to earthquakes, and has frequently suffered from these terrible visitations. The most destructive on record occurred in October, 1746, when many houses and public buildings were destroyed. On the same occasion the port of Callao was suddenly submerged by a huge wave, and with exception of some twenty or thirty, all the inhabitants, amounting to 5000, were swept away.

Lima was founded by Pizarro in 1535, and called Ciudad de los Reyes (City of the Kings), in commemoration of the festival day of the kings, on which the site was chosen. This name having been confirmed in 1537 by Charles V., from that time Lima became capital of Peru and the seat of the viceroys. In January, 1881, Lima capitulated without striking a blow to the Chilians, who occupied it for upwards of two years. Pop. in 1876, 101,488.

LIMA-WOOD, a name sometimes given to the wood of *Cæsalpinia echinata*. See BRAZIL-WOOD.

LIMBER. See GUN-CARRIAGE.

LIMBURG, or LIMBOURG, a province of Belgium, bounded on the north by Holland, east by Dutch Limburg, south by the province of Liége, and west by Southern Brabant and Antwerp; area, 926 square miles. It is flat throughout; strata chiefly calcareous, and remarkably rich in fossils, furnishing many fine quarries of limestone. Iron, calamine, and lead are found in several localities. The eastern frontier is skirted by the Meuse, which, along with the canal from Maestricht to Hertogenbosch, affords water communication to Holland. Another canal leads to Herenthals, in the province of Antwerp. These facilities enable Limburg to carry on an important transit trade. A considerable part of the province, particularly towards the north, belongs to the Campine (see BELGIUM), and consisting almost entirely of barren heath or pure sand, is desolate in the extreme. Towards the centre and the south the soil is tolerably fertile; on the east, along the valley of the Meuse, its quality becomes superior, and the banks are covered with rich pastures. Buckwheat, rye, spelt, barley, and rape-seed are grown; a few cattle and large numbers of pigs are reared. Distilleries are numerous; there are several beet-root sugar refineries; and the manufactures include soap, salt, pottery-ware, paper, tobacco, straw-hats, &c. The chief towns are Hasselt, the capital; Tongres, Maeseyck, and St. Trond. The province was formed in 1839 of the greater part of the ancient province of Limbourg, which formerly belonged to Belgium, but a portion of which was now given up to Holland. Pop. (1880), 210,851.

LIMBURG, a province of Holland, bounded on the north by the province of Northern Brabant, east by Rhenish Prussia, south by Belgium, and west by Belgian Limburg and the province of Northern Brabant. It contains all of the former Austrian province of Limburg lying on the right side of the Maas, the districts north of a line drawn from the most southern point of Northern Brabant to the Maas, south of Thorn, and the town and district of Maastricht; area, 850 square miles. It is partly flat, partly undulating, rich and fertile along the Maas, but in the north and west cold and sterile, large portions being covered with heath and marsh, and belonging to the extensive morass named the Peel. Besides the Maas the chief streams are the Roer, Geule, Itterbeek, and Tongelreep. Rye, wheat, barley, oats, buckwheat, hemp, flax, oil-seeds, and green crops are cultivated; good butter and cheese are made, and pigs are very numerous. Coal, potters'-earth, and building-stone are found. Agriculture and cattle-rearing are the chief occupations, but the distilling of gin and other spirits, and manufacturing tobacco, chicory, paper, cloth, glass, leather, soap, &c., are carried on; also cotton-spinning and calico-weaving. Besides Maastricht its chief towns are Roermond, Venlo, and Weert. Pop. (1879), 239,453.

LIMBUS (Latin, edge, border) signifies in patristic theology the place where the patriarchs remained until the advent of Christ, who, before his resurrection, appeared to them, and opened the doors of heaven for them. The doctrine of a limbus is contained in several of the fathers, but was only fully developed by the schoolmen, who deduced from it the Roman Catholic doctrine of purgatory. They divided the souls awaiting judgment into five classes. The first inhabit *Paradise*. It is the abode until the resurrection of the fathers of the old church, who received, on the descent of our Lord into Hades, an access of glory and felicity; also of the faithful who are freed from purgatory, and of the martyrs whose souls are in the Apocalypse represented as beneath the altar. The second is the *Limbus Patrum*. It is the abode of those who lived before our Lord's incarnation, and who remain in the same state as before our Lord's descent into Hades. Third, the *Limbus Infantium*, sometimes identified with the *limbus patrum*, is the abode of infants who die unbaptized. Fourth, *Purgatory* is the abode of the faithful whose imperfections require a remedial process of suffering to prepare them for heaven. Fifth, the *Infernum* is the abode of those who are without hope of salvation, but whose final destination is not determined till the judgment. Dante's great poem is founded on these speculations. *Limbo* figuratively means any place of confinement or restraint. Milton's limbo—'large and broad, since called the paradise of fools, to few unknown'—is borrowed from the *limbus* of the scholastic theologians and Ariosto's receptacle of lost things.

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LIME. This oxide, which in a state of combination is one of the most abundant bodies in nature, has been known and used from the remotest antiquity. The forms in which it occurs native are very numerous. Combined with carbonic, sulphuric, phosphoric and other acids it constitutes large rock masses, and even mountains; it is present in sea and other waters; it is a constituent of most soils and of a great number of minerals; and is essential to plants and animals. The following are some of the more interesting natural compounds:—

1. *Native Lime.*—From the tendency of lime to combine with the carbonic acid in the atmosphere native lime can exist only in very peculiar circumstances. A specimen of it, however, taken from a lagoon in Tuscany, was analysed a long time ago by Faraday, who found it to consist chiefly of lime, with a little silica, iron, and alumina. Through the muddy bottom of the lagoon, hot water saturated with lime is constantly oozing up, the lime absorbs carbonic acid from the air, and forms a pellicle, which gradually thickens to a crust, which protects the lime continually depositing underneath from the carbonic acid. The origin of this lime may be due to the volcanic decomposition of the limestone rocks which abound in this region; but it is remarkable that the lime should be dissolved in the water and come up to the surface in the caustic state.

2. *Arseniate of Calcium*, or *Pharmacolite*, is a rare mineral, found in small quantity at Andreasberg, in the Hartz, and at one or two other places in Europe. It occurs in minute fibres or acicular crystals, which are commonly aggregated into botryoidal or globular masses. Its colour is white, or grayish-white, though often tinged of a violet red by arseniate of cobalt, which accompanies it. Specific gravity, 2·73. It consists of lime 25, arsenic acid 50·54, and water 24·46. On heating, arsenical fumes are evolved, and the mass fuses to an enamel; the mineral dissolves readily in acids.

3. *Borate of Calcium.*—There are several minerals which contain borate of calcium. *Bechilite*, a hydrated borate of calcium, is found in the Tuscany lagoons as an incrustation; and a similar salt in silky flakes has been met with in some of the hot springs of the Andes. *Hayesine*, or *ulexite*, and *cryptomorphite* are borates of calcium and sodium; *hydroboracite* is a borate of calcium and magnesium; *howlite* and *datholite* (which see) are silicoborates of calcium. Several of these are employed as sources of boracic acid.

4. *Carbonate of Calcium; Iceland-*, *Calcareous-*, or *Calc-spar*, when pure; *Limestone*, when massive.—The account of the mineral already given (see CALCITE) may here be supplemented by some additional notice. The fundamental or primary form is an obtuse rhomboid of 105° 5′ and 74° 55′; secondary crystals (of which 800 are known) are varieties of the rhomboid, the six-sided prism, or of a double six-sided pyramid, all of which afford the primitive rhomboid by cleavage with the most perfect facility. Lustre vitreous; prevalent colour white, also different shades of gray, red, green, yellow, dark brown, and black, from foreign admixtures; streak grayish-white; transparent to translucent; double refraction very considerable and easily observed; brittle; hardness such as to admit of being easily impressed by the knife; specific gravity 2·72. Besides occurring in distinct crystals it exists in stalactitic, botryoidal, and fruticose shapes, with surfaces uneven, drusy, rough or smooth; and composition columnar, more or less distinct, straight, diverging, and of various sizes. Stalactitic and botryoidal varieties are often composed a second time of curved lamellar particles conformably to the surface of the imitative shape; the faces of composition being uneven and rough, or irregularly streaked in a longitudinal direction. It also occurs massive, the composition being either columnar, in which the individuals are straight, parallel, or diverging, and often of remarkable delicacy, or the composition is granular, the individuals being of various sizes, and even impalpable. The individuals in these varieties cohere more or less firmly. If the composition be impalpable the fracture becomes splintery, uneven, flat, conchoidal, or even; on a large scale it is sometimes scaly. The fracture is earthy in those varieties in which the individuals cohere but slightly. The breaking up of this species into sub-species and varieties, which was practised by the older writers on mineralogy, and which has left us numerous particular denominations and no little confusion, requires notice in this place. These distinctions, it will be seen, depended chiefly upon the mode of composition, and upon admixtures and impurities with which the individuals have been affected during their formation. Of these *limestone* represents the greater part of the pure varieties of the species. The simple varieties, and those compound ones in which the individuals are of considerable size and easily cleavable have been called *calcareous spar;* compound varieties of granular, still discernible individuals, are *granular limestone;* both comprehended under the head of *foliated limestone.* If the granular composition disappear *compact limestone* is formed, under which denomination the *oolite* or *roestone* was comprehended. The roundish grains, however, of the latter consist of columnar individuals, disposed like the radii of a sphere, and frequently showing distinct traces of cleavage. *Common fibrous limestone* is produced by columnar composition in massive varieties; the *fibrous calcsinter* by the same, but appearing in various imitative shapes. *Peastone* or *pisolite* consists of diverging columnar individuals collected into curved lamellar ones, forming globular masses, which are again agglutinated by a calcareous cement. Each of the globules generally contains a fragment of some heterogeneous matter, as quartz, granite, &c. Compact limestone passes into *chalk* when the individuals are more loosely connected with each other, so that the whole assumes an earthy appearance; and *rock milk* or *agaric mineral* is formed if the mass contains so many interstices that it seems to possess but a small degree of specific gravity. *Calcareous tufa*, a recent deposit, formed on the surface of the earth, is often cleavable, and thus possesses all the properties of calcareous spar. *Slate spar* is produced by a lamellar composition in massive varieties, and often exhibits a pearly lustre. *Swinestone, anthracolite, marl*, and *bituminous marlite* are impure and mixed varieties, partly of calcareous spar, partly of compact limestone. The pure varieties of rhomboidal limestone consist of lime 56, and carbonic acid 44. Very often the varieties contain variable proportions of oxide of iron, silica, strontia, magnesia, alumina, carbon, or bitumen. If pure it is entirely soluble in nitric acid, during which a brisk effervescence takes place. In the common fire it is infusible, but loses its carbonic acid, and becomes burned, or quicklime. Limestone rarely enters into the composition of rocks; in most cases the more considerable masses of it form particular beds in other rocks, or constitute rocks themselves; the latter consist chiefly, though not exclusively, of compact limestone, the former of granular limestone. The simple varieties occur in drusy cavities, more frequently in veins than in beds, accompanied with the varieties of different species. Calcareous tufa and rock-milk being of a sintery formation occur upon the surface and in fissures of limestone rocks. Stalactitic and pisiform varieties are produced by calcareous

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springs and other waters. The mixed or impure varieties occur in particular strata, between those of compound varieties of other species. It very often occurs in petrifactions imbedded in compact varieties of the same species. Rhomboidal limestone, as has already been remarked, is a species very widely diffused in nature; several of its varieties have a considerable share in the constitution of mountains in many countries. This is particularly true in Switzerland, Italy, Carniola, Carinthia, Salzburg, Stiria, Austria, and Bavaria, and in several parts of America. Of crystallized varieties the most remarkable occur in Derbyshire and Cumberland, in the mining districts of Saxony and Bohemia, in the Hartz, in Carinthia, Stiria, Hungary, and France, and in the United States at Lockport in New York, forming geodes in compact limestone. Iceland is the locality of the purest and most transparent varieties, from whence come the best pieces of the doubly-refracting spar. The crystallized sandstone of Fontainebleau in France is a variety of rhomboidal limestone mechanically mixed with sand. Slate-spar occurs in Saxony, Norway, and Cornwall. Pisolite is found in Carniola and at Carlsbad in Bohemia. Most of the varieties are so common as to render the mention of their localities unnecessary. Several varieties of the present species are usefully employed for various purposes, partly depending upon their mechanical, partly upon their chemical composition. Those used in sculpture and in ornamental architecture are called *marble;* the more common or coarse varieties are used for the common purpose of building; a peculiar variety of very fine-grained compact limestone is used for plates in lithography. The best sort is found near Pappenheim and Sohlenhofen in Bavaria. Quicklime mixed with sand and water forms mortar. Carbonic acid for chemical purposes is obtained from chalk or preferably from marble in small pieces. It is also a valuable addition in several processes of melting ores, and in producing certain kinds of glass. There is another species in mineralogy called *Arragonite*, which is interesting as the substance which led to the discovery of dimorphism (which see). In composition it is identical with calcite, but its crystallization and other characters sufficiently characterize it as distinct. It occurs in crystals, which at first sight appear to be regular six-sided prisms, but a close inspection will discover a longitudinal crevice down each lateral face, and somewhat similar appearances converging in the centre of the terminal planes. It also occurs in prismatic crystals of four or six sides, terminated by planes, the prisms often being so short as to impart to the crystal the general form of an octahedron; these are rarely separate, but mostly cross each other at particular angles. Its crystals yield to mechanical division parallel to the lateral planes of a right rhombic prism of 116° 5′ and 63° 55′ by measurement taken with the reflective goniometer on cleavage planes. Lustre vitreous, inclining to resinous, upon faces of fracture; colour white, sometimes passing into gray, yellow, or mountain green; transparent or translucent; brittle; hardness such as to scratch calcareous spar; specific gravity, 2·93. It is very liable to occur in globular, reniform, and coralloidal shapes, and massive, with a columnar composition. Imbedded crystals, generally twins, or consisting of a greater number of individuals, are found in compound varieties of gypsum, mixed and coloured with oxide of iron, accompanied by crystals of ferruginous quartz. Other varieties occur in the cavities of basalt and other trap-rocks, in lavas, and in irregular beds and veins. It is found in beds of iron ores in those coralloidal varieties which have been called *flos-ferri;* also massive and crystallized. The first, though they occur in cavities and fissures, are not products of a stalactitic formation. The most beautiful crystals, well-defined and transparent, occur near Bilin, in Bohemia, in a vein traversing basalt, and filled with a massive variety of the same species, consisting of large columnar particles of composition. The varieties imbedded in gypsum have been found in the Kingdom of Arragon in Spain, whence the name *Arragonite* has been derived. Its chief localities are the iron mines of Styria, Carinthia, and Hungary, and the metallic veins of the Pyrenees and Great Britain.

Fluoride of Calcium. See FLUOR.

Nitrate of Calcium, or *Nitrocalcite*, is found in tufts or masses of silky crystals efflorescing on the soil and in limestone caverns, such as those in Kentucky. It is deliquescent and soluble, and when heated upon charcoal fuses and deflagrates. It is used as a source of nitric acid by lixiviating with water, adding carbonate of potassium, allowing the carbonate of calcium to settle down, and then evaporating the solution till the nitrate of potassium crystallizes. Nitrate of calcium is probably the form in which that acid generally occurs in spring and river waters. According to some chemists, indeed, the presence of carbonate of calcium is essential to the process of nitrification, and thus nitrate of calcium is the first native compound of the acid.

Oxalate of Calcium, or *Whewellite*, occurs in brittle, lustrous, monoclinic crystals, associated with calc-spar. It is not common.

Phosphate of Calcium, *Phosphorite*, or *Apatite*, is found crystallized in six-sided prisms, terminated by one or more planes, or the prism is terminated by a six-sided pyramid, and the lateral edges are sometimes replaced by numerous planes. It yields with difficulty to cleavage parallel to the side of a regular six-sided prism, which is therefore considered as its primitive form. Lustre vitreous, inclining to resinous; colour white, passing into blue, green, yellow, red, and brown; transparent or translucent; brittle; hardness above that of fluor; specific gravity, 3·22. When in fine powder it is slowly dissolved in nitric acid, and without effervescence. Some varieties are phosphorescent upon ignited charcoal, and before the blowpipe; others even when rubbed with hard bodies. It does not melt alone before the blowpipe. It is composed of lime 55·0, and phosphoric acid 42·99, with fluoride or chloride of calcium. It usually occurs in beds and veins of iron and tin ores. Its principal localities are Saxony, Bohemia, Salzburg, and Cabo de Gata in Spain, from which latter place very beautifully crystallized specimens are obtained, and which have received from their colour the name of *asparagus stone*. It is also found at St. Gothard, and in Devonshire and Cornwall. Phosphate of calcium occurs massive in very great quantities in Spain, in Britain, forming coprolites (which see), in the Southern States of America, known in the trade as Charleston phosphate, in Sombrero Island in the Gulf of Mexico, and as guano on the islands off South America. All these varieties contain sand, rock fragments, iron, alumina, magnesia, and in the case of guano animal and organic matter. They are imported and used in enormous quantities as manures and as sources of phosphoric acid.

Sulphate of Lime or *Gypsum* ($CaSO_4 2H_2O$) is a mineral little less extensively diffused than limestone, forming immense beds and veins in numerous countries. It presents us with a very considerable diversity of crystals, which have for their primary form a right-oblique-angled prism, of which the bases are oblique-angled parallelograms of 113° 8′ and 65° 52′. The crystals are either prismatic or lens-shaped in their general aspect; lustre vitreous, inclining to pearly; colour white, sometimes inclining

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and passing into smalt-blue, flesh-red, ochre-yellow, honey-yellow, and several shades of gray. Impure varieties assume dark-gray, brick-red, and brownish-red tinges. Transparent or translucent; sectile; specific gravity, 2·3. It occurs in globular masses, in which the individuals are discernible; also granular, passing into impalpable. Those varieties of sulphate of lime which are pure, transparent, and perfectly formed were formerly called *selenite*, while the more massive and impure varieties were denominated *gypsum*. The latter was again divided into several sub-species, comprehending almost exclusively compound varieties, which were easily distinguishable from each other, as their division depended upon the size of the grain or composition in general. Thus *foliated* gypsum consists of discernible granular particles; *compact* gypsum of impalpable particles of composition; *scaly foliated* gypsum consists of minute scaly particles; *earthy* gypsum of a mealy powder; very thin columnar composition produces *fibrous* gypsum. Before the blowpipe gypsum exfoliates and melts, though with difficulty, into a white enamel, which after a short time falls to powder. In a lower degree of heat it loses its water and becomes friable, so as to be easily reduced to an impalpable powder. If mixed with water this powder becomes warm, and soon hardens into a solid mass. The massive varieties of this species occur in beds of a considerable thickness, in secondary districts, in connection with compact limestone, different kinds of sandstone and clay in alternating layers, in the latter of which the gypsum sometimes exists in imbedded masses or crystalline groups. It is not rare to find deposits of rock-salt in its vicinity, and brine-springs very often issue from the contiguous rocks. Of the organic remains found in gypsum, those of extinct species of terrestrial quadrupeds in Montmartre caverns, Paris, are the most remarkable. It occurs in a great many countries, particularly in Germany, Switzerland, Austria, Poland, Britain, France, and Spain; in North America, in the United States, at Niagara Falls, Lockport, and particularly in the vicinity of Cayuga Lake; and in New Brunswick and Nova Scotia. Gypsum is variously employed in manufacturing artificial marble, stucco-work, mortar, &c.; also for making casts of statues, medals, &c. It is added to the mass of certain kinds of porcelain and glass. In sculpture it is used under the name of *alabaster*. But next to its use in the formation of cements is the use which is made of it in agriculture. It appears to have been first used as a manure in Germany, and afterwards in France. It was formerly calcined, but is now ground in mills after the manner of grain. It is particularly adapted to sandy soils and grass lands. Another species of the same composition with gypsum, except the water, is called *anhydrite* (which see). It is of comparatively rare occurrence.

Tungstate of Calcium, or *Scheelite*, after Scheele, who first discovered 'tungstic acid' in it, occurs massive and crystallized in the form of an octahedron with a square base. Lustre vitreous, inclining to adamantine; colour generally white, inclining to yellowish-gray; translucent or transparent; brittle; hardness that of fluor; specific gravity, 6; infusible before the blowpipe. It consists of lime 19·40, tungstic oxide 80·42. It is found in Bohemia, Saxony, and Cornwall.

The artificial compounds obtained from the preceding, and especially from the carbonate, are the following:—Lime, the oxide of the metal calcium (which see), is obtained with most facility from the carbonate, from which by a strong heat the carbonic acid may be expelled. This process is conducted on a large scale with the different varieties of limestone, which are calcined or burned in order to obtain the caustic earth, or *quicklime*, as it is called. The lime thus obtained, however, is rarely pure enough for chemical purposes. The chemist, therefore, when he would obtain a very perfect article, calcines transparent crystals of carbonate of calcium or prepares it from solution in the following manner. Marble or chalk is dissolved in diluted hydrochloric acid, leaving an excess of lime undissolved; ammonia is added, which precipitates alumina and other oxides. The filtered solution is then decomposed by carbonate of ammonium, and the carbonate of calcium being washed with water and dried, is decomposed by a strong heat. The lime thus obtained is a soft, white substance, of the specific gravity of 2·3. When pure it is quite infusible, but when heated in the oxyhydrogen blowpipe it emits one of the intensest of artificial lights, and it has accordingly been employed for a signal light and for facilitating the observation of distant stations in geodetical operations. It is soluble in about 700 parts of cold water. The solubility is diminished by heat. If a little water be sprinkled on new-burned lime it is rapidly absorbed, with the evolution of much heat and vapour. This constitutes the phenomenon of slacking. The heat proceeds from the combination of the water with the lime, forming a *hydrate*, as slacked lime is now called. It is a compound of 56 parts of lime with 18 of water, or rather more than 3 to 1. The water may be expelled by a red heat.

Lime-water is astringent, and somewhat acrid to the taste, and is strongly basic. It renders vegetable blues green; the yellow brown; and restores to reddened litmus its usual purple colour. When lime-water stands exposed to the air it gradually attracts carbonic acid, and becomes an insoluble carbonate, while the water remains pure. If lime-water be placed in a capsule under an exhausted receiver, which also incloses a saucer of concentrated sulphuric acid, the water will be gradually withdrawn from the lime, which will crystallize in small six-sided prisms. Lime, submitted to the action of galvanism in high intensity, afforded Sir H. Davy satisfactory evidence of its compound nature. It was discovered, in common with the other earths, to consist of a metal, which he denominated *calcium*, and oxygen. The calcium was obtained in these experiments in the state of amalgamation with mercury. On exposing the amalgam to the air or to water oxygen was absorbed and lime reproduced. In an experiment designed to obtain the base in an insulated state by distilling the quicksilver from it the tube broke while warm, and at the moment that the air entered, the metal, which had the colour and lustre of silver, took fire, and burned with an intense white light. Calcium has since been obtained by decomposing iodide of calcium with metallic sodium in a closely covered iron crucible. See CALCIUM.

Chlorine combines directly with lime, forming the very important substance used in bleaching, formerly under the name of *oxymuriate of lime*, but now *chloride of lime*, or *bleaching-powder*. It is formed by passing chlorine gas over slacked lime. A great variety of apparatus has been at different times contrived for favouring the combination of chlorine with slacked lime for the purposes of commerce. The following is one form that has been recommended: It consists of a large chamber, 8 or 9 feet high, built of siliceous sandstone, having the joints of the masonry secured with a cement composed of pitch, rosin, and dry gypsum in equal parts. A door is fitted into it at one end, which can be made air-tight by strips of cloth and clay lute. A window in each side enables the operator to judge how the impregnation goes on by the colour of the air, and also gives light for

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making the arrangements within at the commencement of the process. As water lutes are incomparably superior to all others where the pneumatic pressure is small a large valve or door on this principle is recommended to be made in the roof, and two tunnels of considerable width at the bottom of each side wall. The apartment would thus be ventilated without the necessity of the workmen approaching the deleterious gas. A great number of wooden shelves, or rather trays, 8 or 10 feet long, 2 feet broad, and 1 inch deep, are provided to receive the sifted slacked lime, containing generally about 112 parts of lime to 48 of water. These shelves are piled one over another in the chamber to the height of 5 or 6 feet, cross-bars below each keeping them about 1 inch asunder that the gas may have free room to circulate over the surface of the powder. The stills for generating the chlorine are in some cases made entirely of lead, in others of two hemispheres joined together in the middle, the upper hemisphere being lead, the under one cast-iron. The first kind is inclosed for two-thirds from its bottom in a leaden or iron case, the interval of 2 inches between the two being destined to receive steam from an adjoining boiler. Those which consist below of cast-iron have their bottom directly exposed to a very gentle fire. Round the outer edge of the iron hemisphere a groove is cast, into which the under edge of the leaden hemisphere fits, the joint being rendered air-tight by Roman or patent cement—a mixture of lime, clay, and oxide of iron, separately calcined and reduced to a fine powder. It must be kept in close vessels, and mixed with the requisite water when used. In this leaden dome there are four apertures, each secured by a water-lute. The first opening is about 10 or 12 inches square, and is shut with a leaden valve, with incurvated edges that fit in the water channel at the margin of the hole. It is destined for the admission of a workman to rectify any derangement in the apparatus of rotation or to detach hard concretions of salt from the bottom. The second aperture is in the centre of the top. Here a tube of lead is fixed, which descends nearly to the bottom, and down through which the vertical axis passes, to whose lower end the cross-bars of iron or of wood, sheathed with lead, are attached, by the revolution of which the materials receive the proper agitation for mixing the dense manganese with the sulphuric acid and salt. The motion is communicated either by the hand of a workman applied from time to time to a winch at top, or it is given by connecting the axis with wheel-work, impelled by a stream of water or a steam-engine. The third opening admits the syphon-formed funnel through which the sulphuric acid is introduced; and the fourth is the orifice of the delivery pipe. The proportion of the materials for generating the chlorine is as follows: 10 cwts. of salt are mixed with from 10 to 14 cwts. of manganese, to which mixture, after its introduction into the still, from 12 to 14 of sulphuric acid are added in successive portions; that quantity of acid must, however, be previously diluted with water till its specific gravity becomes about 1·65. The delivery pipes from all the stills terminate in a leaden chest or cylinder, with which they are connected by water-lutes, having a hydrostatic pressure of 2 or 3 inches. In this general *diversorium* the chlorine is washed from adhering hydrochloric acid by passing through a little water; and from this reservoir the gas is conducted off by one general pipe and delivered into the top of the chamber containing the lime, where, in consequence of its gravity, it diffuses itself equally over powder spread out upon the shelves. Four days are required for making good marketable bleaching-powder. The manufacturer generally expects from 1 ton of rock-salt, employed as above, 1½ ton of good bleaching-powder. Since the necessity of condensing hydrochloric acid produced in the alkali works was laid upon the manufacturer the acid has to a great extent been substituted for the salt and sulphuric acid of the preceding method. The stills are stone-ware jars inclosed in tight stone chests, and they are provided with a delivery tube for the gas, an opening for charging, and a pipe at the bottom for running off the spirit liquor containing chloride of manganese, and which is generally recovered and reconverted into peroxide again. *Chloride of lime* is used in immense quantities for bleaching and as a disinfectant.

Sulphide of Calcium is not a substance of much importance. It can be got by the direct union of sulphur and metallic calcium, but it is usually prepared by making the sulphate of calcium into a paste with oil and starch, and heating the mixture in a crucible. Decomposition ensues; carbonic acid gas escapes, and a gray, porous, amorphous mass remains, consisting of the sulphide. It is soluble in water with an alkaline reaction, and hepatic taste and odour, and is readily decomposed by acids. The deep red solution formed by digesting lime, sulphur, and water together contains probably polysulphides of calcium and hyposulphite.

Phosphide of Calcium is obtained in the following manner:—A few pieces of phosphorus are placed at the bottom of a glass tube, which is then filled with small pieces of lime. The part of the tube where the lime is is heated red-hot, and the phosphorus is then sublimed by heat. Its vapour passing over the lime decomposes it, and a reddish coloured phosphide of calcium is formed. This substance reacts at once with water, causing an immediate production of phosphuretted hydrogen, which takes fire at the surface of the water.

Lime combines with the acids, neutralizing the acid properties. Its salts are in general decomposed by potash or soda, which precipitate the lime, but not by ammonia. Oxalic acid throws down lime from all the other acids; and this compound being quite insoluble, oxalic acid forms the most delicate test of the presence of lime. It is also distinguished by the characteristic orange-red colour which its compounds impart to flame.

Carbonate of Calcium may be formed by adding carbonic acid to lime-water or by decomposing any of the soluble salts of calcium by any of the alkaline carbonates. It is very sparingly soluble in water. Hence lime-water is an excellent test of the presence of carbonic acid. By an excess of carbonic acid carbonate of calcium is rendered soluble. When this solution of lime-water is boiled, the excess of carbonic acid is expelled and the carbonate is precipitated. This phenomenon is constantly observed when hard calcareous water is used in boilers, which soon become coated inside with the carbonate. A similar deposition takes place in petrifying springs. When exposed to heat it first loses what water it contains, and if transparent and hard becomes white, opaque, and friable. If the heat be augmented the carbonic acid is expelled, and quicklime remains. The experiments of Sir J. Hall long ago proved that if carbonate of calcium be heated under strong pressure so as to prevent the escape of the carbonic acid it may be melted at a temperature even not higher than 22° of Wedgwood's scale. By this fusion it acquires considerable hardness and closeness of texture, approaching in these qualities, as well as in fracture and specific gravity, to the finer kinds of marble. The acids expel the carbonic acid with effervescence; and this property affords a partial test of the presence of this salt.

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Nitrate of Calcium is formed by dissolving lime or its carbonate in dilute nitric acid. The solution on evaporation affords deliquescent, prismatic crystals, soluble in less than an equal weight of water, at the temperature of 60°, and in still less of boiling water. On being heated it becomes phosphorescent, and retains this property when cold, forming *Baldwin's solar phosphorus*. It forms naturally in the plaster of old buildings.

Sulphate of Calcium is formed by adding lime to dilute sulphuric acid. It requires about 500 times its weight of water at 60° for its solution. At the temperature of 212° it is more soluble, and this latter solution on cooling deposits minute crystals. Exposed to heat it appears to effervesce or boil, owing to the expulsion of its water; and at the same time becomes opaque, and falls into a white powder which, on being diffused in water, speedily consolidates from a species of irregular crystallization. Sulphate of calcium is one of the most abundant minerals in nature.

Phosphate of Calcium may be formed by decomposing the solution of an alkaline phosphate by nitrate or chloride of calcium. It is a white, insoluble powder, which is imperfectly vitrified by a very intense heat. It exists in the mineral kingdom under different forms, and constitutes about 60 per cent. of the bones of animals; but the amount varies in different species, and in the same species with the age and sex. Phosphate of calcium is used in porcelain making.

Chloride of Calcium.—When lime is heated strongly in contact with chlorine oxygen is expelled, and the chlorine is absorbed. For every 2 parts in volume of chlorine that disappear 1 of oxygen is obtained. It is a semi-transparent, crystalline substance; fusible at a strong red heat; a non-conductor of electricity; has a very bitter taste; rapidly absorbs water from the atmosphere, and is hence often employed in chemical experiments to deprive gases of any hygrometric vapour existing in them. Chloride of calcium with 6 molecules of water of crystallization is readily obtained by dissolving marble or calcite in hydrochloric acid, and evaporating to crystallization. By a moderate heat part of the water is expelled, and a crystalline mass remains; at a still higher temperature all the water is expelled, and fused chloride is formed. The salt is excessively soluble in water, and also in alcohol, with which indeed dry calcic chloride forms a crystallizable compound. A saturated solution of the salt boils at 355° Fahr.

Uses of Lime.—These are almost too numerous to mention, for there is hardly any operation in the arts for which lime is not at some part indispensable. It is employed in the early stages of leather dressing to remove hair, fat, &c., from the hides; it is used in metallurgy as a flux; in soap-boiling to causticize the alkaline liquors; in the manufacture of washing soda by Leblanc and Dizé's process; for neutralizing acids; for making mortars and cements; and in agriculture to destroy inert or noxious vegetable matter, to decompose heavy clay soils, or soils containing undecomposed granites, gneiss, and other rocks which resist atmospheric changes. This it probably effects by combining with the silica of these rocks and liberating the small quantities of alkalies they contain.

LIME, or LINDEN (*Tilia*, natural order Tiliaceæ). The species of linden are large trees, with alternate, simple, and cordate leaves, and flowers disposed on a common peduncle. The common linden (*T. Europæa*) is a large and handsome tree, with yellowish-green flowers on a stalked cyme springing from a large lanceolate foliaceous bract; the fruit is coriaceous and downy. The inner bark of all the species is very tenacious. The wood of the European lime is smooth, close-grained, and much used by carvers and turners. The American lime or bass-wood is a large and beautiful tree, inhabiting Canada and the northern parts of the Union. The leaves are cordate, acuminate, serrate, and smooth. The flowers are yellowish, supported on long pendulous peduncles. The wood is white and soft, and is used for a few unimportant purposes. In some countries the fibrous inner bark is separated by soaking in water, and manufactured into fishing-nets, mats, shoes, and clothing; and the cordage made from it is said to be remarkably strong and elastic. The wood is sometimes cut into thin strips and used in the manufacture of chip hats, which resemble those made of straw.

LIME (*Citrus*). See CITRON.

LIME-JUICE, the juice of the fruit of various species of Citrus, principally limes. See CITRON.

LIMERICK, a maritime county of Ireland, province of Munster; bounded north by the Shannon, Clare, Tipperary; east by Tipperary; south by Cork; and west by Kerry; area, 680,842 acres, of which 585,951 are arable. The surface is in general flat, or an undulating plain, excepting in the north-east, south, and south-west, where it rises into mountains. The principal rivers, exclusive of the Shannon, are the Maig, Deale, and Mulkerna. The subsoil is limestone, trap, and sandstone; and a large proportion of the soil friable and sandy loam. Iron, copper, and lead ores are found in various localities throughout the district occupied by the trap protrusions, but no veins are at present worked. The county is peculiarly fertile, particularly on the banks of the Shannon and in the 'Golden Vale,' a tract which extends from the borders of Tipperary west through the centre of the county. The acreage under crops in 1883 was 173,279, of which 3121 were under wheat, 23,833 under oats, 112,595 under clover and grasses, and 22,673 under potatoes. The number of cattle in 1883 was 211,044, sheep 46,363, pigs 67,355, agricultural horses 9903. Some of the best long-horned cattle in the empire are produced and fattened in this county. The occupations are chiefly agricultural; pasturage and dairy farming are most general, tillage is less attended to. The condition of the larger farmers is generally good. Both men and women are industrious, their cottages neat and well kept, and the farms comparatively well managed. Large quantities of the produce of the county are exported. The manufactures are coarse woollens, lace, paper, flour and meal. Limerick is intersected with several lines of main and branch railways. It returns two members to Parliament. Limerick city returns two. Its chief towns, besides Limerick, are Rathkeale and Newcastle. Pop. in 1841, 329,923; in 1881, 180,632.

LIMERICK, a city, Ireland, capital of Limerick county, and a county of itself. It lies on an extensive plain, at the interior extremity of the estuary of the Shannon, 106 miles S.S.W. of Dublin, with which and with Cork it is connected by railway. It consists of three portions, distinguished by the names, respectively, of English and Irish Towns, and Newtown-Pery. The first and oldest occupies the southern end of the King's Island—a tract formed by the Shannon, here divided into two streams; the other two stand on either side of the river. The different parts of the city are connected by five bridges, one of which, the Wellesley Bridge, a magnificent structure, crossing the harbour, cost £85,000. In English Town the houses are chiefly built in the Flemish fashion. Irish town is very old, and the streets are narrow; but the houses generally more modern than in the former, where everything has an appearance of misery and decay. In Newtown-Pery the streets are spacious, intersect each other at right angles, and are lined by elegant houses, shops, and public build-

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ings; it contains a handsome square occupied by the upper classes. The principal buildings are the Episcopal and Roman Catholic cathedrals, court-house and prisons, custom-house, chamber of commerce, exchange, assembly-house, linen-hall, corn and butter markets, several hospitals, and barracks. The manufactures include the curing of bacon, the preparation of butterine, flax spinning and weaving, and lace-making. There are, besides, distilleries, breweries, tanneries, corn-mills, a large military clothing establishment, a patent slip for vessels of 500 tons, and three ship-building slips. Limerick is the leading port on the west coast for the shipment of raw produce. The harbour extends about 1600 yards in length and 150 in breadth, with from 2 to 9 feet at low water and 19 feet at spring-tides, which latter enable vessels of 600 tons to moor at the quays, and of 1000 tons at the floating dock. The harbour, naturally a fine one, has been improved at an outlay of about £200,000, advanced on loan by government, including the cost of the Wellesley swing-bridge, mentioned above. For some time previous to 1866 the trade had been declining, partly on account of the high rate of the shipping and port dues, but in 1867 an act was passed authorizing the commissioners of the treasury to compound the debt, and to advance £20,000 more for constructing a graving-dock and completing the harbour improvements; this, with the abolishing of import and export duties on a considerable number of articles, has tended greatly to revive the trade. The number of vessels entered in 1882 was 554 of 167,986 tons (57 of 29,552 tons being from foreign ports); cleared 464 of 156,653 tons. The borough returns two members to Parliament. Pop (1881), 48,670.

LIMIT, in mathematics, is a determinate quantity to which a variable one continually approaches in value. If a polygon be inscribed in a closed curve, its area is of course less than the area inclosed by the curve; but as the inscribed polygon is made to have more and smaller sides its area gets more nearly equal to that of the curve, and we say that although its area can never be equal to that of the curve, the area of the curve is the limiting value of the area of the polygon when its sides become indefinitely small and infinite in number. Again, let points A and B in a curve be joined; as B is supposed to be nearer and nearer A, the chord A B is more and more nearly coincident with the tangent at A, and, in fact, the tangent is the limiting position of the chord A B when B is brought indefinitely near to A. Consider the expression $\frac{x}{1+x}$, where x is positive: if $x = 1$, then the expression is equal to $\frac{1}{2}$; if $x = 1000$, the expression is equal to $\frac{1000}{1001}$; and as x gets a greater and greater value the expression becomes more and more nearly equal to 1, and its difference from 1 can be made smaller than any conceivable fraction by giving a sufficiently great value to x; hence as x is made indefinitely great, the expression $\frac{x}{1+x}$ approaches the limit 1. The expression $\frac{\sin.\ \theta}{\theta}$ (where θ is an angle expressed in circular measure) approaches the limit 1, as θ is diminished without limit; or, using an abbreviated form of expression, the limit of $\frac{\sin.\ \theta}{\theta}$ is 1 when $\theta = 0$. It is sometimes stated that tan. $90° = \infty$, whereas in the recognized sense there is no such thing as the tangent of a right angle; the statement is an abbreviated form of—The tangent of an angle less than a right angle becomes greater and greater without limit as the angle becomes more and more nearly equal to a right angle. The notion of a limit as indicated in the above examples is the foundation of the differential calculus.

LIMITATION, STATUTES OF (in English law). It is a universally recognized principle of law that certain limits of time should be fixed within which actions may be brought for the enforcement of all legal rights not completed or maintained by use or possession. Previous to 1540, when the statute 32 Henry VIII. cap. ii. introduced the principle of limiting a period previous to the commencement of every suit, fixed epochs of limitation, as the commencement of some previous reign, were established. By 3 and 4 William IV. cap. xxvii. the time for making an entry or distress, or bringing an action to recover land or rent, is fixed at twenty years after the right to make such entry has accrued. The time when a right of action accrues is declared to be the time of death of a person claimed from in a succession, the time of dispossession or of last receipt of profits or rents in the case of adverse possession, or in the case of an instrument the time of entry assigned by the instrument. In the case of a reversion or remainder the right or interest is held to have accrued when the reversion becomes an estate of possession by the determination of the intervening estate or estates. By this statute the mere non-payment of rent gives an adverse claim to the tenant, which after twenty years becomes indefeasible. When land is rented without lease the expiration of the first year or period of tenancy or the time of the last payment of rent is held to be the time when the right accrues. When rent is paid under a lease to a wrong person the right accrues from the time of the first wrong payment. In suits for the redemption of mortgages the claim accrues from the time of the last acknowledgment of the mortgage by the mortgagee. Suits in equity are limited to the same period as suits in law. Ecclesiastical and eleemosynary corporations sole may make entry until six years after a third appointment, or for sixty years full if this period does not amount to sixty years. Advowsons are limited to three adverse incumbencies or sixty years, but not to exceed 100 years. A younger brother or other relative of an heir cannot take possession for him, but a written acknowledgment of a title to land or rent by the person in possession to a claimant or his agent is held to constitute the time at which the claim accrues. Persons under disabilities, infancy, coverture, idiocy, lunacy, unsoundness of mind, or absence beyond seas, are exempted from the usual period of limitation, provided the action be brought within ten years after the termination of the disability. If the disability be terminated by the death of the person affected by it the heir may bring an action within ten years of his death, but no second disability will extend the period of disability beyond ten years after the death of the first person subject to the disability. In neither of the preceding cases, however, can any action be brought more than forty years after the first accruing of the right. Adverse possession for twenty years against a tenant in tail bars all remainders through him. Arrears of rent or dower are not recoverable after six years. By the act 19 and 20 Victoria, cap. xcvii. actions for account and suits concerning trade and merchandise must be commenced within six years after the cause of such actions or suits. One item in an account does not cover another. Bills of exchange and promissory notes must be sued for within six years after they are due (26 James I. cap. xvi. See BILL). Bonds and covenants must be sued within twenty years (3 and 4 William IV. cap. xlii.); crown suits within sixty years (9 George III. cap. xvi.) A right of way or watercourse may be established by twenty years' enjoyment, and becomes absolute and indefeasible after forty years' enjoyment. The time is also fixed for appeals from lower to higher, and for

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bringing various other actions at law. An action for assault, battery, &c., must be brought within four years, an action for death by accident within one year. In a charge of murder the injured person must have died within a year and a day of the time when the injury was inflicted. The American law is mainly based on the English statutes. For the law of limitation in Scotland see PRESCRIPTION.

LIMITED LIABILITY. See JOINT-STOCK COMPANIES.

LIMNORIA. See ISOPODA.

LIMOGES (ancient *Augustoritum Lemovicum*), a town of France, department of Haute-Vienne, crowning the top and occupying the acclivity of a hill washed by the Vienne, here crossed by three bridges, 88 miles west of Clermont. Except in the new parts of the town the houses are mostly of wood, and the streets narrow and crooked. The old walls and towers which formerly surrounded the town have been thrown down, and their site converted into fine shady boulevards. The most remarkable edifices are the cathedral, commenced in 1272 and not completed till 1515; the church St. Michel des Lions, a Gothic edifice, remarkable for the light and airy appearance of the pillars which support its roof, and the boldness of the belfry, which terminates in a ball of extraordinary size; and the church of St. Pierre du Queyroix, surmounted by a fine spire. Limoges has a bishop's palace, built of granite, the finest modern edifice of the town; a public library, theatre, cavalry barracks, and several hospitals. The principal industry is the manufacture of porcelain, employing about 6000 hands; there are also wool and cotton spinning mills, cloth factories, foundries, paper-mills, and extensive shoe and clog making establishments. It has a considerable trade in cereals, wine and spirits, wood, and cattle. Limoges is an entrepôt for the trade of Toulouse, and generally of the southern departments of France. It is the see of a bishop, and the seat of courts of first resort and commerce; of a consulting chamber of commerce, a college, a university, academy, scientific society, &c. Limoges was originally the capital of the Gallic tribe the Lemovices. Under the Romans it was adorned with a capitol, an amphitheatre, fine temples, and palaces. In 1370 it was stormed and given up to fire and sword by the Black Prince; in 1790, and again in 1864, whole quarters of the city were destroyed by fire. Pop. (1881), 63,765.

LIMONITE (Greek *leimōn*, a meadow), an ore of iron, varieties of which are bog iron-ore and brown hæmatite. It is a hydrated oxide of iron ($2Fe_2O_3.3H_2O$) of a brownish colour, occurring in mammillated or botryoidal masses, which when broken across show a fibrous radiating structure, and also in compact and earthy masses. It is opaque, rather brittle, moderately hard, and has specific gravity 3·6 to 4. It dissolves in warm aqua regia; when heated it loses water and becomes magnetic. It is a very important ore of iron, and is found in various parts of England, and abundantly on the Continent and in America.

LIMOUSIN, or LIMOSIN, an ancient province in the centre of France, bounded by Guienne, Auvergne, Marche, and Angoumois. Limoges was the capital. It forms at present the chief part of the departments of Haute-Vienne and of Corrèze.

LIMOUX, a town of France, department of the Aude, on the left bank of the Aude. It has well-laid-out streets; and the houses which line them are generally good. There is a spacious parish church, richly ornamented; an hospital, and a small theatre. It has manufactures of broad-cloth, worsted-mills, tanneries, and dye-works, and a trade in iron, wine, olive-oil, green soap, leather, &c. There is here a communal college. Pop. 6283.

LIMPET (*Patella*), a genus of Gasteropodous Mollusca, the conical shells of which are so plentiful on the rocks at low tide-mark all round our coasts. The limpet adheres to rocks partly by the suctorial powers exerted by its broad disc-like foot, and partly by a strong glutinous secretion given off by the mucous follicles and canals of the foot. That suction alone was not the cause of their adhesion, was proved by Reaumur, who cut a limpet through when adhering to the rock, when each half still kept its place on the stone. By such a process the vacuum would have been destroyed, and the animal would have become dislodged had the suctorial powers alone operated. At the same time these powers are undoubtedly also exerted, and apparently by the median muscular fibres of the foot. Most commonly the limpet is found ensconced in a shallow depression or pit excavated out of the rock, and which it has made or rasped out by the siliceous or flinty particles embedded in its foot. From this pit the limpet appears to make short journeys in search of food, returning to occupy its own and definite hollow. The food appears to be chiefly vegetable matter, which these animals rasp down by means of the long 'lingual ribbon' or tongue they possess; this organ consisting of an elongated fleshy strap, imbedded in which are rows of flinty teeth. This apparatus is used somewhat after the fashion of a chain-saw. Limpets possess a singularly wide distribution over the seas of the world. The common species (*Patella vulgata*) is eaten by the poorer classes of Scotland and Ireland, but forms an indifferent, tough article of diet. In tropical seas they attain an immense size. The Key-hole Limpets (*Fissurellidæ*) possess a breathing aperture at the top or apex of the shell. The gills in both kinds of limpets form a circle round the body, immediately within the mantle which lines the shell. And from the conformation of the gills the limpets and allied forms are included in the division of Cyclobranchiata or 'circle-gilled' Gasteropods. Other species familiar to conchologists, and commonly seen in shell-cabinets, are the Blue Limpet (*P. cærulea*) of St. Helena; the Long-spined Limpet (*P. longicosta*); the *P. umbella* from African coasts; the Ruby-eyed Limpet (*P. granatina*) from the Antilles, and the Bearded Limpet (*P. barbata*).

LIMULUS. See KING-CRAB.

LINACRE, or LYNACER, THOMAS, an eminent physician, born at Canterbury about 1460, after receiving his first education in his native town entered Oxford, and obtained a fellowship of All Souls' College in 1484. He afterwards proceeded to Italy, resided for some time successively in Bologna, Florence, Padua, and Rome, and on his return was intrusted by Henry VII. with the education of Prince Arthur. During the reign of Henry VIII. he stood at the head of the medical profession. He ultimately abandoned his medical practice for the church, and obtained several important preferments. He died in 1524. In 1518 he founded the College of Physicians, of which he continued president till 1524. He was one of the best Latin scholars of his age. His Latin translation of the works of Galen was particularly praised by Erasmus. Besides these translations he wrote a work which acquired much celebrity, De emendata structura Latini sermonis, in six books 4to (London, 1524). It has frequently been reprinted on the Continent.

LINCOLN, a large maritime county on the east coast of England, bounded on the north by the estuary of the Humber, east by the German Ocean and the Wash, south by the counties of Cambridge, Northampton, and Rutland, and west by Leicester, Nottingham, and York; area, 1,767,879 acres. The county has a complete network of railways, placing

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all parts of it in connection with the general railway system of the country. The surface is generally an uninterrupted plain, the greater portion of which lies below the level of the sea, being protected by embankments. Great parts of this fenny tract were at some unknown period a woody country, but were afterwards inundated, and are now again recovered from the sea. Some of the fens were embanked and drained by the Romans, but after their departure the sea returned, and large tracts were covered with beds of silt containing marine shells, now again converted into productive lands. Drainage by artificial as well as natural means is now thoroughly understood and largely carried out. In a few places the fens and marshes continue nearly in their natural state, but in general they have become, through the long-continued and well-directed efforts that have been made for their drainage and improvement, sound and dry, and constitute one of the most productive and best-cultivated tracts in the kingdom. Round the Wash a great deal of very fine land has been gained from the sea since the commencement of the present century, and the embankments are gradually extending. By these means 680,000 acres of land have been brought into cultivation. The soil thus redeemed from waste consists principally of an alluvial deposit, the chief feature of which is a blue calcareous clay. In consequence of the richness of its pastures Lincolnshire has been long celebrated for its breed of horses, cattle, and sheep. Some of the finest dray-horses seen in London are bred in the fens. The cattle are a coarse large sort of short-horns, but they have latterly been a good deal improved by crossing with the Teeswater breed. The native sheep of the county are remarkable for their great size and for the extraordinary length of their wool. In the best parts of the fens and marsh under tillage the crops chiefly cultivated are oats and wheat. The farm-buildings on the better class of farms are of a very superior description. The total acreage under crops of all kinds, bare fallow, and grass in 1882, was 1,508,440, of which 613,174 acres were under corn, and 234,362 under green crops. The total number of cattle in 1882 was 203,888; sheep, 1,235,894; agricultural horses, 50,066. Manufactures and minerals are of little importance, though the making of implements and steam-engines for agricultural purposes is extensive, and iron-stone has been discovered in considerable quantities in various parts of the county. Principal rivers, Trent, Witham, Welland, and Ancholme. The Witham has been made navigable from Boston to Lincoln; and the Foss-dyke Canal, extends from the latter city to the Trent, near Torksey, completing internal navigation between the Wash and the Humber. There are also canals from the Witham to Horncastle and Sleaford, and from Tetney Haven, on the east coast, to Louth. The climate has been greatly improved by the draining of the fens. Lincolnshire is divided into three parts—Holland, Kesteven, and Lindsey; and into thirty-one wapentakes, hundreds, liberties, and sokes, besides the city of Lincoln and the municipal boroughs of Boston, Grantham, Great Grimsby, Louth, and part of Stamford. For parliamentary purposes it is divided into North, South, and Mid Lincolnshire, each returning two members; the borough of Great Grimsby in North Lincolnshire returns one member; Lincoln city in Mid Lincolnshire returns two, Boston and Grantham in South Lincolnshire return two each, and Stamford one. Pop. in 1871, 436,599; in 1881, 469,919. The county is within the diocese of Lincoln.

LINCOLN, a city and county in itself, England, capital of Lincolnshire, 120 miles north of London, situated on the slope and summit of an eminence rising from the left bank of the Witham, and on the Great Northern Railway, where it is joined from the south-east by the Great Eastern, the south-west by the Nottingham and Lincoln, and from the north-east by the Manchester, Sheffield, and Lincoln lines. The upper part of the city consists of a number of narrow irregular streets. In the lower part a spacious street, commencing on the right bank of the river, is continued across it by a bridge, and then traverses a considerable part of the town; here many recent improvements have been made, and handsome houses and places of business erected. There is a small people's park, opened in 1872. The principal edifice is the cathedral, finely situated on the top of the eminence, and forming, from the flatness of the surrounding country, a very conspicuous object at a considerable distance. It is one of the finest of the English cathedrals, and is built in the form of a double cross, chiefly in the early English, but partly also in later styles. The west or principal front has richly-decorated door-ways, windows, arcades, and niches, and is flanked by two pinnacled towers, each 206 feet high. A still more magnificent tower rises from the intersection of the nave and principal transepts to the height of over 260 feet, and terminates likewise in pinnacles. The famous bell, known by the name of the 'Great Tom of Lincoln,' cast in 1610, hung in the north-west tower, but having become cracked in 1827, after several ineffectual attempts at repair, it was taken down in 1834, and recast into a new bell 6 feet 10½ inches in diameter at the mouth, 5 tons 8 cwts. in weight, now hanging in the central tower. The principal access to the cathedral from the west is by three door-ways of handsome proportions and richly decorated. That in the centre has immediately over it a series of canopies containing statues of eleven English kings. The interior, which is 482 feet in length, has a very imposing effect. The cathedral was commenced about 1073, and completed in 1092. It received additions at various times, the western towers being completed in 1450. The building has since 1862 undergone a course of restoration, but externally, and especially on the western front, much injury has been done by rechiselling the carved work. There are besides fourteen other churches, and a like number of dissenting places of worship. The other most conspicuous buildings are the Guildhall or Stone-bow (of the time of Richard III.), spanning the High Street, and perhaps the finest antique gate-house in the kingdom; the remains of the castle which was founded by William the Conqueror as one of his four great strongholds, but was completely ruined during the Commonwealth; new and extensive barracks, the old episcopal palace, once a noble structure, but now only an interesting ruin; the fine old Roman arch spanning Hermin Street, and considered the most perfect Roman gateway in England; the county assembly-rooms, the assize courts, two theatres, county hospital, lunatic asylum, a prison, corn-exchange, masonic hall, railway-stations, &c. The most important educational establishments are a theological college, the free grammar, the diocesan, and various other schools, including a school of art. The manufacture of agricultural implements and machines forms the chief branch of industry, employing between 3000 and 4000 hands. There are also coach-works, tanneries, roperies, and numerous corn mills. The trade is chiefly in flour and wool. There are four annual fairs, one of which lasts a week, and is one of the greatest horse-fairs of the kingdom. Races are held twice a year (March and November).

Lincoln has been identified with the Roman *Lindum Colonia* (in Bede it occurs as *Lindacolina*); and from the number of antiquities which have been found, and the ancient remains still existing

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within it, it appears to have early attained considerable importance. After the departure of the Romans it became the capital of the Saxon Kingdom of Mercia, and suffered much during the struggles between the Saxons and the Danes. The castle was built by William the Conqueror about 1086, and afterwards strengthened with a foss-dike. It continued to be a place of considerable importance in the kingdom, and was a frequent object of contention during civil wars. Parliaments were frequently held here during the early part of the fourteenth century. The borough was incorporated in 1313. In 1716 it was made a county of itself. During the Parliamentary war its adherence to the royal cause cost it many sacrifices. It sends two members to Parliament. Pop. (1881), 37,313.

LINCOLN, ABRAHAM, the sixteenth president of the United States of America, was born in Kentucky, 12th February, 1809. He removed with his family in 1816 to Spencer county, Indiana, and for the next ten years was engaged in hard work of various kinds, having only about a year's schooling at intervals. In 1830 the family removed to Macon county, Illinois, and subsequently he was for some time in charge of a store and mill at New Salem. On the breaking out of the Black Hawk war in 1832 he joined a volunteer company, and was elected captain of it, a promotion which gave him more pleasure than any subsequent success in his life. He served three months in the campaign. He next opened a country store, which did not succeed; was appointed postmaster of New Salem, and began to study law by borrowing books from a neighbouring lawyer. At the same time he turned amateur land-surveyor. In 1834 he was elected a member of the Illinois legislature, to which he was again returned at the three following biennial elections. In 1836 he was licensed to practise law, and in 1837 he removed to Springfield, and opened an office in partnership with Major John F. Stuart. He soon became distinguished as an advocate in jury trials. He still continued to take a prominent part in party politics, and in 1844 he canvassed the whole of Illinois and part of Indiana, making almost daily speeches to large audiences on behalf of Henry Clay. In 1846 he was elected a representative in Congress for the central district of Illinois. He voted steadily in Congress with the anti-slavery party, especially opposing the extension of slavery to new territories. In 1849 he was a candidate, unsuccessfully, for the United States Senate. Until 1856 he continued to pursue his profession, taking at the same time an active share in party political movements in Illinois. In 1858 the republican state convention nominated him as candidate for the United States Senate in opposition to Mr. Douglas. The two candidates canvassed the state together, addressing everywhere the same meetings. In this canvass, when pressed by his opponent, he admitted the right of the Southern States to a fugitive slave law, and declared that, while determined to keep slavery out of the territories, if any territory demanding admission to the Union should deliberately adopt a slave constitution, he saw no alternative but to admit it into the Union. He gained a majority on the popular vote of about 4000, but Douglas was elected senator by the legislature by a majority of eight on joint ballot. This defeat only inspired Lincoln and his supporters with fresh determination, and induced them to aim at a higher achievement. In the Republican national convention held at Chicago in May, 1860, he was nominated as a candidate for the presidency, and after several votes for diminishing the number of candidates, in which he ranked below Seward, he gained a majority over him, and was eventually chosen unanimously. The other candidates for the presidency were his old opponent Douglas, Breckinridge, and Bell. This division of his opponents proved fatal to the Democrats or Southern party, who for a long period had uniformly carried the presidential elections. Lincoln had a majority of more than 500,000 votes over Douglas, while the other two Democratic candidates divided more than 1,250,000 votes between them. The Southern States, exasperated at this defeat, and alarmed at the aggressive anti-slavery policy which many of the leading Republicans had proclaimed their determination to follow in the event of success, refused to acquiesce in Lincoln's election, and on the doctrine of the sovereignty of the states and the voluntary character of the Union, began one after another to announce their secession, and to organize the means of resisting the enforcement of the claims of the central government. This movement began during the closing period of the administration of Buchanan, the interval which, according to the United States constitution, intervenes between the election of a president and his assumption of office. This circumstance was probably unfortunate for Lincoln, as no position could be less suitable for resisting such movements than that of a retiring president. The election of Lincoln took place in November, 1860, and he assumed office on the 4th of March, 1861. In this fatal interval the time of conciliation, if it had ever existed, passed away. It was the intention of Lincoln to use every means of conciliation consistent with the policy he deemed it essential to the national interest to pursue. On one point, however, his resolution was steadfast, to admit no secession, and before his assumption of office secession was as resolutely determined on on the other side. On the 4th of February the Southern Confederacy had been constituted, and on the 14th of April the first blow in the civil war was struck by the capture of Fort Sumter by the Confederates. The events of the next four years in Lincoln's career belong to the history of the United States, where they will be dealt with in more detail. The spirit in which the war was conducted by the president, and his qualifications for guiding the state through the crisis in its affairs, of which his election had been the occasion, were aptly indicated in his advice to his generals when the long succession of Southern successes had raised keen discussion in the North as to the proper policy for pursuing the war. While not indifferent to suggestions as to tactics, the president's final prescription was to 'keep pegging away;' and it was his persistence in raising and pouring in fresh troops after every disaster that, in spite of deficient generalship and faulty tactics in their earlier campaigns, finally enabled the Federal government to subdue the secession. Without this, which was Lincoln's share of the work, the military capacity of Grant and Sherman would never have had the opportunity of showing itself. Another feature of President Lincoln's policy which demands notice here was displayed in his successive proclamations abolishing slavery. As we have seen, this formed no part of his previous policy as a statesman. It was suggested by the exigencies of war, but a revolution of such social magnitude could never have been undertaken on the dictation of a war policy alone. The toleration of slavery was always in Lincoln's opinion an unhappy necessity; and when the Southern States had by their rebellion forfeited their claim to the protection of their peculiar institution, it was an easy transition from this view to its withdrawal. The successive stages by which this was effected—the emancipation of the slaves of rebels, and the offer of compensation for voluntary emancipation, followed by the constitutional amendment and unconditional emancipation

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without compensation—were only the natural steps by which a change involving consequences of such vast extent is reached. The determination of the Northern States to pursue the war to its conclusion on the original issue led to the re-election of Lincoln as president in 1864. The decisive victory of Grant over Lee on 2d April, 1865, speedily followed by the surrender of the latter, had just afforded the prospect of an immediate termination of this long struggle, when, on the 14th of the same month, President Lincoln was shot in Ford's Theatre, Washington, by an assassin named John Wilkes Booth, and expired on the following day. The sudden termination of Lincoln's career gave for the time a sort of sanctification to his character, and arrested the sharp criticism to which his administration would otherwise have been subjected, and which yet probably awaits it. Notwithstanding his Carnot-like energy in organizing armies, there can be little doubt that his notions of a military policy were painfully defective, and that he showed little discernment in his choice of generals. His inferiority in this respect to his rival Davis, as well as the disparity of military skill which at first so greatly favoured the South, no doubt contributed to drag out a war so destructive of human life. It may be a question for the future, too, whether the sudden emancipation of millions of slaves was a wise and statesmanlike mode of reaching a desirable consummation; and the subsequent hostilities and ill-feeling between the whites and blacks in New Orleans and elsewhere in the South give rise to grave doubts on this head.

LINCOLN COLLEGE, Oxford, was founded in 1427 by Richard Fleming, bishop of Lincoln. The existing statutes were enacted under authority of a parliamentary commission in 1855. They provide for a rector, ten fellows, and fourteen scholars on the foundation. Other scholarships are added from time to time from the proceeds of two suspended fellowships. The Bishop of Lincoln is visitor of the college.

LINCOLN'S INN. See INNS OF COURT.

LINDISFARNE. See HOLY ISLAND.

LINDLEY, JOHN, botanist, was born at Catton, Norfolkshire, 5th February, 1799. His father was the owner of a nursery garden near Catton, and he was early initiated in a knowledge of horticulture. He received his education at the grammar school of Norwich. He commenced writing on botanical subjects before he had attained his twentieth year. His first publication (1819) was a translation of Richard's Analyse du Fruit. This was followed in 1820 by Monographia Rosarum, which was illustrated by several of his own drawings. In 1821 he published in the Transactions of the Linnæan Society, Observations on Pomaceæ, two separate works Monographia Digitalium and Collectanea Botanica, and a paper on Duckweed in Hooker's Flora Scotica. He went about this time to London, and in 1822 was appointed assistant-secretary to the Horticultural Society. He was engaged for about seven years writing the descriptive matter for Loudon's Encyclopædia of Plants. He determined the genera and species, prepared the specific characters, wrote or examined the notes and corrected the press during the preparation of this work, which was published in 1829. This work marks a transition between the artificial and natural systems of botany, being based according to London's plan on the Linnæan system, with a second part re-arranging the orders and genera according to the natural system, and showing by mutual references the relations between the two. In 1829 Lindley was appointed professor of botany in the London University (University College). He published in 1829 a Synopsis of the British Flora arranged according to the natural order; in 1830 an Introduction to the Natural System of Botany; in 1832 an Introduction to Systematic and Physiological Botany, afterwards Elements of Botany, structural and physiological. In 1835 he was appointed lecturer on botany at the Chelsea Botanic Gardens. In 1836 he published a Natural System of Botany, being a revised and extended edition of his Introduction, in which he introduced some new views of classification which have not been generally received. A sixth edition, further enlarged, was published in two vols. in 1848. In 1838 appeared Flora Medica, being a detailed description of plants used in British medicine. A Key to Structural, Physiological, and Systematic Botany (1839) contained further new views of classification and nomenclature. In 1846 he published the Vegetable Kingdom, a very comprehensive and valuable work, giving a condensed account of the structure, geographical distribution, and uses of plants. Many new editions of this work have been published, but as it was stereotyped at first, the changes are unimportant. The classification contains more extensive innovations than in his previous works. In 1849 he published Medical and Economical Botany. These works did not exhaust Professor Lindley's industry. He edited or contributed to such papers as the Gardener's Chronicle and the Botanical Register, for which he classified and described numerous now familiar plants, his favourite group being the orchids. His Genera and Species of Orchidaceous Plants and Folia Orchidacea (1852–55) were the results of twenty years' study of this order of plants. At an earlier period he published The Theory and Practice of Horticulture (1840), a work which has been translated into various European languages, and has exercised a powerful influence on the practice of horticultural art. He also wrote the botanical articles for the Penny Encyclopædia as far as the letter R. His connection with the Horticultural Society as assistant secretary was continued during the whole of this period, and the society maintained under his superintendence an extensive horticultural establishment at Turnham Green, which was supported by the profits derived from shows of fruits and flowers, until the rival shows at Regent's Park and the Crystal Palace caused it to be discontinued. Lindley received, among other foreign honours, the degree of Ph.Dr. from the University of Munich. He was a member of numerous scientific societies, both home and foreign. In his later years his health began to fail from over-exertion. He died at his residence in Turnham Green, 1st November, 1865.

LINDSAY, an ancient family in Scotland. The first of the name in Scotland known to annalists appears to be one WALTER DE LINDSAY, who in 1116 acted as a witness or juror in the inquest instituted by David I., when prince of Cumbria, into the possessions and rights of the see of Glasgow, and who was one of the great barons during the reign of David I. Previous to this the Lindsays are supposed to have flourished in England and Normandy. Lord Lindsay, in his Lives of the Lindsays, gives eighty-eight different spellings of the name, which he identifies with the Norman Limesay, signifying island of lime-trees.—WILLIAM DE LINDSAY of Ercildun was high justiciary of Lothian between 1189 and 1199; he married Marjory, daughter of Henry, prince of Scotland, and was the first of the Lindsays connected with the territory of Crawford in Lanarkshire, which afterwards took from them the name of Crawford Lindsay. SIR DAVID, his eldest son, was high justiciary of Scotland. He died in 1214. This branch of the family ended in the heiress ALICE LINDSAY, who married Sir Henry Pinkeney, a baron of Northamptonshire, whose grandson Sir Robert

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Pinkeney claimed the crown of Scotland in 1292 as the descendant of the Princess Marjory.

Sir Walter de Lindsay, ancestor of the Lamberton branch of the family, was the second son of William de Lindsay of Ercildun. He received Lamberton as his share of his father's estates. In 1215 he was sent by Alexander II. as ambassador to John, king of England. He had estates in Huntingdonshire, which he forfeited when he joined the English barons against King John. His son, Sir William, married an English heiress, through whom he acquired extensive estates in Westmoreland, Yorkshire, and Lancashire. His grandson, Sir William, married Ada, sister of John Baliol. His daughter and heiress married Ingelram de Guignes, Sire de Couci, who sat in her right in the Scottish estates, and was a devoted adherent of King Edward I.

William de Lindsay, third son of William de Lindsay of Ercildun, received from his father the barony of Luffness in Haddingtonshire. His son, Sir David Lindsay, and his cousin Sir David of Lamberton, were among the great barons who swore to the peace of 1244 between Scotland and England. His son, Sir David, was one of the regents of Scotland in 1255, and high-chamberlain in 1256. His son, Sir Alexander, was high-chamberlain. His grandson, Sir Alexander, swore fealty in 1296 to Edward I. He afterwards joined Wallace, submitted unconditionally to Edward on 9th July, 1297, joined Wallace again, and in 1305 was one of his seven adherents who were excepted from the general pardon offered by Edward. In 1307 he invaded Galloway along with Edward Bruce and the good Sir James Douglas, and his sons also adhered steadfastly to the cause of Bruce. The eldest, Sir David, with two of his brothers, was taken prisoner at or previous to the battle of Bannockburn, and exchanged five months afterwards. He signed the letter to the pope in 1320, asserting the independence of Scotland. He was captured at the battle of Halidon Hill in 1333. He married in 1325 the heiress of the Abernethies, with whom he received large estates in Roxburgh, Fife, and Angus. His second son, Sir James, married the sister of Robert II., and had an only son, Sir James Lindsay of Crawford. His third son, Sir Alexander, was father of Sir David of Glenesk, the first Earl of Crawford. Sir Alexander acquired large estates in Angus and Inverness-shire by marrying the heiress of Stirling of Glenesk and Edzell. Sir James Lindsay, lord of Crawford and Buchan, mentioned above, was sent by Robert III. in 1386 with the Earl of Moray to arrange the difference between the clans Kay and Chattan, which was finally decided by the judicial combat on the North Inch of Perth, described by Sir Walter Scott in the Fair Maid of Perth. Sir James joined the Douglases in their incursions into England, and was present at the battle of Otterburn, 19th August, 1388. After the battle he pursued Sir Matthew Redman, governor of Berwick, joint-commander of one of Percy's two divisions, for 3 English leagues, and after an arduous combat made him prisoner. At Sir Matthew's request he allowed him to return to Newcastle on his parole to surrender at Edinburgh at an appointed time. In returning home he missed his way and fell in with a party under the Bishop of Durham, who were going to join Percy, and by whom he was made prisoner and taken to Newcastle. He there arranged with Sir Matthew Redman that they should be exchanged for each other. King Richard, on being informed of his capture, forbade the Earl of Northumberland to admit him to ransom, but ultimately he was set at liberty. He died in 1397, and was succeeded as head of the house by his cousin, Sir David Lindsay, of Glenesk, who married a daughter of Robert II., and was by Robert III. created first Earl of Crawford in 1398. The earls of Crawford attained an immense influence in Scotland, and became rivals of the kings themselves. The castle of Finhaven in Forfarshire was their chief seat. The fourth earl, 'Earl Beardie,' rebelled against James II., but was defeated at Brechin. His lands and life were declared forfeited, but he was afterwards reinstated in them, and restored to the royal favour. The fifth earl was created Duke of Montrose by James III., but this title died with himself. The family afterwards declined in influence, and on the death of the sixteenth earl the dignity of Earl of Crawford was obtained in 1633 by John, tenth Lord Lindsay of the Byres, in Haddington, the representative of another branch of the family. The first Lord Lindsay of the Byres, created in 1445, was grandson of Sir William Lindsay, younger brother of the first Earl of Crawford. The chief seat of the Lindsays of the Byres was Struthers Castle in Fifeshire. The second Lord Lindsay supported James III. against the insurgent nobles; the fourth took part in the expedition that ended at Flodden, and survived the battle; the fifth was one of the four noblemen to whom was committed the charge of the infant Queen Mary, and was a supporter of the Reformation; the tenth lord of the Byres, as already mentioned, became the seventeenth Earl of Crawford. He was a zealous adherent of the Covenant, yet loyal to the Stuarts. The last representative of the Lindsays of the Byres was the twenty-second Earl of Crawford, who died in 1808. The title of Earl of Crawford now belongs to the Lindsays of Balcarres (Earls of Crawford and Balcarres), a branch and afterwards the representatives of the Lindsays of Edzell in Forfarshire. The first of the family of Balcarres was John Lindsay, lord Menmuir, second son of Sir David Lindsay of Glenesk and Edzell. His son, David, was created Lord Lindsay of Balcarres in 1633. See Lives of the Lindsays (by the twenty-fifth Earl of Crawford), and Jervise's Lands of the Lindsays.

LINDSAY, or Lyndsay, Sir David, an ancient Scottish poet, descended from a noble family, was born about the year 1490. He studied in the University of St. Andrews, and in 1509 became page of honour to James V., then an infant. In 1528 he produced his Dreme, and in the following year presented his Complaynt to the king. In 1530 he was inaugurated Lyon king-at-arms, and knighted, and in 1531 sent on a mission to Charles V., on his return from which he married. He soon after occupied himself on a drama of a singular kind, entitled a Satyre of the Three Estatis, which was followed in 1536 by his Answer to the King's Flyting, and his Complaynt of Bagsche. On the death of Magdalen of France, two months after her marriage with James V., Lindsay's muse produced his Deploratioun of the Death of Quene Magdalene. During the succeeding regency he espoused the cause of the reformers, and in 1548 was sent in his capacity of Lyon herald on a mission to Christiern, king of Denmark. On his return he published the most pleasing of all his poems, entitled the History and Testament of Squire Meldrum. His last and greatest work, the Monarchie, was finished in 1553. The date of his death is unknown; it appears to have taken place previous to 1555. Lindsay entered with great zeal into religious disputes, and his satires powerfully assisted to expose the vices of the clergy. As a poet, he is inferior to Dunbar and Gawin Douglas. His Dreme is deemed his most poetical composition. A complete edition of the works of Lindsay was published by George Chalmers in 1806, but a better edition is that published by the Early English Text Society.

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LINE, in military language, is the term used to distinguish the ordinary troops, both horse and foot, from the special services. All numbered regiments, except the guards, belong to the line. The line of battle in the navy is formed by the ships of the fleet ranged close hauled, and at intervals of about 100 fathoms fore and aft of each other. Ships of a class fit to enter the line of battle are called ships of the line.

LINE, Mathematical, is extension in length, without breadth and thickness; it is either straight or curved. In navigation the equator is called the line; hence the expression 'to pass the line.' In decimal measures of length it is the tenth, in duodecimal measures of length it is the twelfth part of an inch.

LINEN, a cloth of very extensive use, made of flax, and differing from cloths made of hemp only in fineness. Hemp is in part now used in manufacturing cloths which are called linen, although the coarser hempen fabrics, as canvas, sail-cloth, &c., do not bear that name. In common linen the warp and woof cross each other at right angles; if figures are woven in it is called damask. The species of goods which come under the denomination of linen are tablecloths, plain and damasked, cambric, lawn, shirting, sheeting, towels, Silesias, Osnaburgs, &c. Linen cloth, or cloth woven of combinations of cotton or other textile fabrics with linen, is printed in the same manner as calico. Fancy cloths are also made by weaving with yarns dyed of various colours, and sometimes with printed yarns. Linen is extensively manufactured in England, Scotland, and Ireland. It is also a staple in the various manufacturing districts of Europe. A recent return gives a comparative statement of the number of spindles employed in spinning flax in different European countries as under:—

Great Britain,	1,500,000
France,	500,000
Belgium,	150,000
Austria,	120,000
Germany,	110,000
Russia,	60,000
Other States,	80,000
Total,	2,520,000

The beauty of linen consists in the evenness of the thread, its fineness and density. The last of these qualities is sometimes produced by subjecting it to rolling, hence linen with a round thread is preferred to that with a flat thread. The warp or woof is not unfrequently made of cotton yarn, which renders such stuff, called union-cloth, less durable. In an historical view linen is interesting from its use by several nations in their religious ceremonies. The Egyptian and Jewish priests wore it at all their religious ceremonies, hence the former are styled by Ovid and Juvenal, 'linen-wearing.' Linen was an article of export from Egypt in the time of Herodotus. From Egypt linen passed to the Romans, but not till the time of the emperors. The Roman priests also began to wear linen garments at that time. Linen was also used as a material for writing, though the expression *libri lintei, carbasini*, was also applied to cotton and silk, as well as linen. The Sibylline books and the mummy bandages, covered with hieroglyphics, are proofs of this use of linen. In the middle ages linen and woollen cloth formed the only materials for dress, and fine linen was held in very high estimation, even the writer of the *Nibelungenlied* mentions it. Germany and Brabant then carried linen manufactures to the greatest perfection.

The linen manufacture has been prosecuted in Britain for a very long period, but though the manufacture has been much extended since the introduction of machinery, its expansion is limited by the greater cheapness and convenience in many respects of cotton. The following is a return under the Factories' Act of the number of operatives engaged in the various processes of manufacture of flax, hemp, and jute in Great Britain in 1874:—

	Factories.	Operatives.
England—		
Flax,	141	22,327
Hemp,	45	3,039
Jute,	15	4,933
Scotland—		
Flax,	159	45,816
Hemp,	112	1,831
Jute,	84	30,893
Ireland—		
Flax,	149	60,316
Hemp,	4	341
Jute,	11	2,094

The exports of linen, the produce of the United Kingdom, for the years 1872 and 1882, were as under:—

	1872.	1882.
Linen yarn	£2,181,071	£1,037,379
Jute yarn	261,239	288,257
Linen piece goods	7,475,074	4,996,219
Sail-cloth and sails	225,291	186,565
Sewing-thread	317,566	372,895
Miscellaneous manufactures	207,759	412,927
Jute manufactures	1,486,484	2,390,653

The chief seat of the English linen manufacture is Leeds and its neighbourhood, where spinning is carried on on a very extensive scale. A single room in one of the factories at Leeds is said to cover 2 acres of ground. Ireland and Scotland, however, are much larger manufacturers of linen than England.

Irish Linen Manufacture.—Linen was woven in Ireland as early as the eleventh century. The manufacture was improved by the refugees who left France on the revocation of the Edict of Nantes, and it was patronized by the Duke of Ormond. In 1698 both houses of Parliament addressed William III., representing that the progress of the woollen manufacture of Ireland was such as to prejudice that of England, and that it would be for the public advantage were the former discouraged, and the linen manufacture established in its stead. Steps were accordingly taken to make this change in the direction of the national industry. Public boards were appointed by Parliament, and besides premiums and encouragements of various kinds, bounties were granted on the exportation of linen down to 1830. In 1829, for example, notwithstanding it had then been very much reduced, the bounty amounted to about £300,000, or to nearly one-seventh part of the entire real or declared value of the linen exported that year. These bounties generally had a very bad effect toward the latter period of their existence on linens produced for exportation. The pieces deteriorated in quality in consequence of the manufacturer studying rather to secure the bounty than to produce a superior article. The result of such a mode of procedure was entirely overlooked so long as sales could be effected and the bounty obtained. No sooner was the bounty withdrawn than the manufacturer perceived that the superiority of his cloth only could enable him successfully to compete in a foreign market. Hence from that period the utmost attention has been bestowed on the strength of material and durability of texture in this staple branch of our manufacture. Yet, after all, the business never began to do any real good, or to take firm root till the manufacture ceased to be a domestic one, and was carried on principally in mills, and by the aid of machinery—a change which the old forcing system tended to counteract. In 1819, when yarns were almost universally made by hand, only 40,000,000 yards of linen cloth

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were exported from Ireland, an amount which in 1849 had increased to 75,000,000, notwithstanding the abolition of bounties on the export of linen, and the repeal of the heavy duties formerly levied on foreign flax and linen fabrics. The amount of linen goods exported from Ireland to Great Britain is estimated at about £10,000,000. The flax factories in Ireland in 1880 had altogether 911,111 spindles and 21,153 power-looms. Of the power-looms weaving linen in Ireland in 1880 10,259 were attached to flax-spinning mills, and 10,894 were in mills wholly devoted to weaving. The average annual consumption of flax fibre in the mills of Ireland varies from 3·14 to 23·71 stones per spindle per annum. The total number of factories in 1862 was only 100, with 592,981 spindles and 4666 power-looms.

Scotch Linen Manufacture.—In 1727 a board of trustees was established in Scotland for the superintendence and improvement of the linen manufacture, and considerable bounties and premiums being given on the production and exportation of linen, the manufacture went on increasing. Still it did not increase so fast as cotton, so that the influence of the bounty in promoting the manufacture may be considered as doubtful. The regulations as to the manufacture, after having long formed a source of objection and complaint by those concerned as injurious and useless, were abolished in 1822, and the bounties then ceased.

Dundee is the grand seat of the Scotch linen manufacture, and its progress there has been extraordinary. The manufacture appears to have been introduced into Dundee some time about the beginning of last century. In 1745 only seventy-four tons of flax were imported without any hemp, the shipments of linen cloth during the same year being estimated at about 1,000,000 yards. In 1791 the imports of flax amounted to 2444 tons, and those of hemp to 299 tons; the exports that year being 7,842,000 yards linen, 280,000 yards sail-cloth, and 65,000 yards bagging. From this period the trade began to extend itself gradually, though not rapidly. About 1815, in consequence partly, and principally, of the improvement of machinery, and its extensive introduction into the manufacture, and partly of the greater regularity with which supplies of the raw material were obtained from the north of Europe, the trade began rapidly to increase. The imports of flax and hemp increased from about 3000 tons in 1814 to 15,000 tons in 1830 (about which time jute was introduced), and in 1850 to 40,450 tons. In 1882 the quantity of flax imported at Dundee was 31,169 tons; of hemp, 1109 tons; of jute, 154,341 tons. Leith and Montrose together imported about 12,296 tons of flax. In 1874 the number of factories in the counties of Forfar, Perth, Fife, Kinross, and Clackmannan (most of them in Forfar, in and around Dundee) was 139, with 228,213 spindles and 16,904 power-looms, and employing 37,716 persons; the number of hemp and jute factories 81, with 186,408 spindles and 7573 power-looms, and employing 29,415 persons.

Manufacture.—The introduction of machinery in the linen manufacture is of recent origin. It followed the adaptation of machinery to the manufacture of cotton, but as there were some special difficulties to be overcome, an interval took place between the invention of the various cotton machines, and their adaptation to the purposes of the linen manufacture. The machinery used both in spinning and weaving linen is in general, with the exception of some special adaptations, the same as that used for cotton. In the article FLAX an account has been given of the preparatory processes to which the raw material is subjected up to the process of *heckling* or combing. This operation, which is intended to clean and separate the fibres of the flax preparatory to spinning, was formerly performed by hand with a large comb, with steel teeth, called a heckle. It is now effected by means of a rotating machine, with sharp teeth. By passing through a series of these machines with successively finer teeth the flax is sorted according to the fineness of the fibres. The flax thus sorted is drawn or formed into continuous *slivers* by a process similar to carding in the cotton manufacture. This process separates the superior fibre from the tow or inferior or broken fibre, which is wrought up again for inferior fabrics. The process having been repeated till the sound fibre is drawn into a uniform band or ribbon about an inch broad, the flax is next *roved*. This is the first process of spinning, and by it the flat sliver is twisting into a soft, round cord. The flax is now ready for spinning. Flax differs from cotton and other textile fabrics in requiring to be wetted during this process, and finer yarn is produced by wetting it with warm water. For further details of these and subsequent processes see COTTON SPINNING and WEAVING.

LINES OF FORCE. If we may neglect the disturbing action of other celestial bodies than the earth, wherever any attracted particle of matter may be, the attractive force is in a straight line to the earth's centre; we say, then, that the space about the earth is full of lines of force, straight lines radiating from the earth's centre. If we take into account the attraction of the moon on any particle in the neighbourhood of the moon and earth, this particle is acted on by a force which is the resultant of two attractions. The direction of this resultant is different at different places; but if curves are drawn in such a way that they represent at any place the direction (that is, the tangent drawn to a curve at the place represents the direction) of the resultant force, these curves are lines of force. It is evident that lines of force cannot cut one another, for the resultant force at any place cannot be in two directions. An electrified sphere in free space surrounds itself with lines of force, which are straight lines radiating from the centre of the sphere; they indicate the directions in which a small electrified particle would be attracted to or repelled from the sphere. They have no existence inside the sphere; for it is well known that an electrified particle is subjected to no force whatever inside an electrified closed conductor. In the neighbourhood of two or more electrified bodies in space the lines of force are curves; as before, the tangent to a line of force at any place represents the direction of resultant force which would act on an electrified particle at that place. Lines of magnetic force are lines in a magnetic field (see FIELD) which show the direction of resultant force on a small magnetic pole placed in the field. They also indicate at any place the direction in which a small, freely suspended magnet, or a piece of soft iron, would place itself in the field. The arrangement of the lines of force in a magnetic field was beautifully shown by Faraday, who sprinkled with a sieve iron-filings on a sheet of paper held over magnets or surrounding wires in which electric currents were passing. The filings arranged themselves in curves which radiated from the poles of the magnets, or circled round the wires. Lines of force may be drawn so as to indicate not only the direction but also the magnitude of the resultant force at any place, by imagining surfaces drawn to cut them at right angles, and allowing the number of lines which pass through unit area at any place to be proportional to the force at that place. Surfaces which are drawn cutting all the lines of force at right angles in a gravitation, electric, or magnetic field, are called *equipotential surfaces*. Clerk Maxwell has adopted Faraday's conception of

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lines of force in his mathematical treatment of electricity and magnetism. He assumes that they have a real existence; and that an action indicated by their directions takes place in the ether surrounding electrified and magnetic bodies. This conception gives the same practical results as the theory of action at a distance; but it is essentially different, and leads to a very different kind of mathematical treatment. See Clerk Maxwell's Electricity and Magnetism, and Faraday's Researches.

LING (*Lota molva*), a species of sea-fish allied to the cod family (Gadidæ), and measuring from 3 to 4 feet in length. The ling resembles the pike in the general shape of its body, but belongs to an entirely different family group. The ling abounds around the British coasts, and its fishery, together with that of the cod, forms an important branch of marine industry. These fishes are caught with hook and line, baited generally with mussels or other molluscs, or frequently with pieces of cuttles, or of fishes. The ling, like the cod, are frequently preserved in immense quantities, either salted or unsalted, in a dried state, and in this shape form an important article of common diet. From the beginning of February to May the ling is in highest perfection; the spawning season commencing in June. The liver contains a large quantity of oil when the fish is in season, and this oil is extracted by subjecting the liver to the action of a slow fire. During the spawning season the quantity of oil in the liver diminishes greatly. Before the abolition of the bounty in 1830 the English law required that those entitled to receive it, should not cure any fish for export which measured less than 26 inches from the shoulder to the tail. These fishes are amazingly fertile, and produce numbers of ova that would scarcely be credited, did not actual observation supply the details. The Burbot (*Lota vulgaris*) or Eel-pout (Pl. CV.–CVI. fig. 8) is a species of ling inhabiting various European rivers and lakes, for example, the Lake of Geneva. It is of elongated form, whence its name of eel-pout, and measures from 1 to 2 feet in length. Its colour is yellow, variegated with brown. The burbot is the only genus of the family Gadidæ inhabiting fresh water. Like the common ling the eel-pout is very prolific, as many as 128,000 ova having been counted in a single fish. Although not generally known, the burbot is highly esteemed in some districts as an article of food. Its flesh is said to be excellent for the table, and the liver is prized by epicures as a great delicacy.

LINGAM (*linga*, Sanskrit, sign or symbol). In Hindu mythology it indicated the *phallus* or emblem of the male generative power of nature. It is worshipped either alone or in conjunction with the *yoni* or female generative power. The worship of the lingam alone, or of the lingam and yoni, mark different sects of Saivas. The lingam is represented by a cylindrical stone, rounded at the top, inserted in masonry in the ground, and transfixing a horizontal stone named yoni. These emblems are placed in temples or in the open fields all over India. The worship of these emblems, which were originally intended as mystical and ideal symbols, has become gross and offensive.

LINGARD, JOHN, historian, was born at Winchester on the 5th of February, 1771, was educated for the Roman Catholic priesthood at Douay, and settled as a priest at Newcastle-upon-Tyne. Here he made his first appearance as an author in 1805, by the publication of a series of letters which he had previously contributed to a local newspaper, and to which, in their collected form, he gave the title of Catholic Loyalty Vindicated. His next work of importance, entitled Antiquities of the Anglo-Saxon Church, is commended by Dibdin (Library Companion, 1825) as a work possessing learning and accuracy, while the Quarterly Review condemns it as containing misrepresentations on every page, and Southey says, 'It is a work not more full of erudition than it is of Catholic sophistry and misrepresentation.' His last and greatest work, the History of England from the Invasion of the Romans to the Year 1688, was first printed in six vols. 4to (1819–25), and reached a fifth edition in 1850, when it appeared in ten vols. 8vo. Lingard's history has since been regarded as a valuable work of reference by historians of all parties. It possesses for Protestant historians the valuable quality of giving the views on controverted points of an able and well-informed Catholic writer. A writer in the Edinburgh Review, while praising the work for industry, learning, and acuteness, and for elegance of style, says, 'He is not only a believer in the Creed and advocate of the discipline of his church; he is the defender of all her saints and confessors, the eulogist of all who have laboured or suffered in her cause, the decrier of all who have resisted her usurpations.' This review was in other respects so unfavourable that Lingard published a Vindication in reply to it. The 1850 edition of the history was elaborately revised by the author. Apart from the peculiar sympathies of the writer, the work is universally regarded as one of high authority. Lingard also published various controversial tracts. He refused a cardinal's hat pressed on him by the pope, but accepted a pension of £300 a year from the queen. After a long life of studious retirement he died at Hornby, near Lancaster, on the 13th of July, 1851.

LINGUA FRANCA, a corrupt Italian, mixed with other words, the dialect spoken between the inhabitants of the coast of North Africa and the Levant and the Europeans. Naturally it is extremely useful for a traveller or any person engaged in commercial pursuits in those countries. It is easily acquired by any person who knows Italian well, and still more easily understood.

LINGULA, a genus of Brachiopodous Mollusca, distinguished by the somewhat flattened elongated shape of the two valves or halves of the shell, which are not articulated or joined together by any hinge-structures. The shell is somewhat horny in its nature; the valves or halves being nearly equal in size. The arms or elongated processes which arise from the sides of the mouth, and which are so characteristic organs in the Brachiopoda, are of fleshy structure, and are not supported, as in many other genera, by limy or calcareous loops springing from the interior of the upper or dorsal shell. The Lingulæ also possess a long fleshy muscular stalk, or *peduncle* as it is called, which passes out between the halves of the shell, at the beak or point where they are articulated, and by this peduncle the animal is moored or attached to fixed objects. There are a few living species of Lingulæ, the best known of which—the *Lingula anatina*—is found in the eastern seas, particularly round the Australian coasts and adjacent localities. Many extinct species are known to palæontologists. And the Lingula, to the geologist, is a very interesting form, from the fact that the genus makes its appearance in almost the earliest rocks which contain fossil remains, and that it has persisted in this way throughout vast periods of geological time; being still represented by living and existent forms, whilst hundreds of other genera of Brachiopoda have become extinct. The Lingulidæ first appear in the Cambrian rocks, and are represented in all the great rock-formations from that time to the present day. (Pl. CXXX.–CXXXI. fig. 6.)

LINIMENT, synonymous with embrocation. See EMBROCATION.

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LINK-MOTION, a contrivance by means of which steam-engines may be at once reversed as to the direction of their motion. It is employed in various forms in locomotives, marine engines, and others of which reversal or stoppage is often necessary. Two eccentrics are provided for the cylinder of a steam-engine; either of these may move the slide-valve and cause it to distribute steam to the cylinder; but they move in nearly opposite directions, and would cause the piston to move in opposite directions. The ends of the eccentric rods are fastened to two ends of a *link;* the end of the valve-rod may be made to slide along this link so as to get its motion from one or other of the eccentrics. By moving a handle the engine-driver can slide the end of the valve-rod to different places on the link, thus causing the engine to be stopped or reversed.

LINKÖPING, a town, Sweden, capital of the län of same name, in a fertile district at the mouth of the Stäng, on Lake Roxen. It is one of the oldest towns in Sweden, and possesses considerable historical interest. In its immediate vicinity in 1596 was fought the battle of Stangebro, in which Sigismund was defeated by his uncle, who shortly after became King of Sweden under the name of Charles IX. The town is tolerably well built, and has a handsome Gothic cathedral, with interesting monuments, two other churches, a gymnasium with a library rich in rare editions of the Bible, a museum, a castle, town-house, and theatre. Pop. 8752.

LINLEY, THOMAS, an eminent English composer, born at Wells about 1725, studied chiefly under Paradies, a celebrated baritone, resident in England. After continuing for some time to conduct the oratorios and concerts at Bath he was induced by Sheridan, who had married one of his daughters, to come to London. Here he continued, in union with Dr. Arnold, to give performances of Handel's oratorios, and afterwards became, with his versatile son-in-law, one of the proprietors and most active manager of Drury Lane Theatre. His music contributed greatly to the success of Sheridan's Duenna, which was performed seventy-five times during the season. He also composed the much-admired accompaniments to the Beggar's Opera, and various vocal pieces remarkable for simplicity and beauty. He died in 1795.

LINLITHGOW, LINLITHGOWSHIRE, or WEST LOTHIAN, a county of Scotland, bounded north by the Firth of Forth, east and south by Edinburghshire, and west and south-west by Stirling and Lanark; area, 76,806 acres, of which about three-fourths are arable. The total acreage under crops and grass in 1882 was 59,575, of which 37,124 were under corn and other rotation crops, and 21,741 under permanent pasture. The total number of cattle in 1882 was 10,324; sheep, 16,000; agricultural horses, 1568. The surface is varied with knolls; but there are few hills of any height. This county has proved itself to be one of the richest in Scotland in minerals of almost every description; coal, shales, ironstone, freestone, limestone, and other minerals are everywhere abundant. Silver, lead, and even gold in small quantities have been found on the Bathgate Hills. The celebrated Torbanehill mineral, which gave rise to so much litigation and difference of opinion among the professors of chemistry throughout Europe as to whether it was coal, was found some years ago, and is still being wrought on the Torbanehill and Boghead estates. The soils are generally strong, and are well drained and well manured. In the south-west parts of the county there is a considerable extent of thin, moorish ground, and some morasses. Climate rather cold. The principal manufacture is that of paraffin-oil, which is carried on at Bathgate, Uphall, and other places. Principal rivers, Almond and Avon. The county returns one member to Parliament; and Linlithgow and Queensferry are each contributory to a parliamentary district. Principal towns, Linlithgow, Bathgate, Borrowstounness, and Queensferry. Pop. (1881), 43,510.

LINLITHGOW, a royal and parliamentary burgh of Scotland, capital of Linlithgowshire, 17 miles west of Edinburgh, in a hollow along the southern bank of Linlithgow Loch, on the Union canal and the Edinburgh and Glasgow section of the North British Railway. It consists principally of one irregular street, about 1 mile long, lying east and west. Though modern buildings are gradually changing the aspect of the place, the town has still a certain air of antiquity about it, which harmonizes well with its historical associations, and with the decaying grandeur of the ancient palace, a massive quadrangular edifice, beautifully situated on an eminence which advances a little way into the lake; once a favourite residence of the kings and queens of Scotland, now a splendid ruin. The principal buildings are the old parish church of St. Michael, the new town-house, with sheriff's court-room and jail; to these may be added the Cross Well, an elaborate structure of a hexagonal figure, adorned with a variety of sculptural and grotesque figures, cleverly executed. The church is of great antiquity, and is considered one of the most perfect existing specimens of the early ecclesiastical architecture of Scotland. The manufacture of boots and shoes, and the tanning and currying of leather, are carried on to a considerable extent. In the vicinity are an extensive distillery, a large brewery, and several glue-works. It was from a house in the main street of Linlithgow that Regent Murray was shot by Hamilton of Bothwellhaugh. Pop. in 1881, 3913.

LINNÆAN SOCIETY, a society in London, instituted in 1788 by Dr. (afterwards Sir) J. E. Smith, and incorporated in 1802, for the promotion of the study of all departments of botany and zoology. It is well supported by the scientific men of the country, has an excellent library, a museum, and herbarium, the nucleus of which were formed by the collections of Linnæus himself, which were purchased by Smith when a young man. The society publishes its Transactions. The annual meeting is held on 24th May. Applicants must be proposed by three fellows. Admission fee, £6; annual subscription, £3. Fellows take the initials F.L.S.

LINNÉ, KARL VON, commonly called LINNÆUS, the most celebrated naturalist of his age, was a native of Sweden. He was the son of a clergyman, and was born May 24, 1707, at Råshult, in the province of Småland. His father was fond of gardening, and his little domain was stocked with plants not commonly cultivated—a circumstance to which the prevailing taste of the son may be fairly attributed. He was sent to the grammar-school, and afterwards to the gymnasium of Wexiö, to be educated for the ministry; but as he disliked the studies of the school, and preferred to collect plants and catch butterflies, he remained behind his fellow-pupils in Latin and Greek, and the teachers declared to his father that he was only fit for a mechanic. The father sent him to a shoemaker; but the physician Rothmann, having discovered talents in the boy, induced his parents to let him study. As botany afforded him no prospect of a support, Linné was obliged to study medicine. In 1727 he entered at the University of Lund in Scania, whence he removed the following year to Upsala. During his early residence there the narrowness of his father's circumstances exposed him to great difficulties, from which he was relieved by the patronage of Celsius, the theological professor, an eminent naturalist, who had become acquainted with him in

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the botanical garden at Upsala, and through whose recommendation he obtained some private pupils. He also formed a friendship with Artedi, a medical student like himself, devoted to the cultivation of natural history. He now, in his twenty-fourth year, conceived the idea of a new arrangement of plants, on the sexual system of botany, relative to which he wrote a memoir, which was shown to Rudbeck, the botanical professor, who was so struck with its ingenuity that he received the author into his house as tutor to his sons, and made him his assistant in the office of delivering lectures. Forty years before Rudbeck had made a journey to Lapland, which excited the curiosity of the learned. A new journey was now concluded upon, and in 1732 Linné was sent by the Academy of Sciences at Upsala to make a tour through Lapland, from which he returned towards the close of the year. Fifty Swedish dollars were thought sufficient by Linné to defray his expenses, and with this small sum he made a journey of more than 3500 miles unaccompanied. In 1733 he visited the mining district around Fahlun, and gave lectures on mineralogy, having formed a system of that science, afterwards published in his Systema Naturæ. While he was thus adding to his reputation at Upsala he became involved in a violent quarrel with the medical professor Nicholas Rosen, who seems to have acted with a great deal of illiberality, and found means to prevent Linné from continuing his private lectures. He therefore engaged in a scientific tour through the province of Dalecarlia, and remained for some time at Fahlun, lecturing and practising medicine with considerable success. He again went to Lapland on a mineralogical tour with seven young men, and in 1735 published a complete Flora of this country—a classical work. In the same year he went to the University of Harderwyck in Holland, and took the degree of M.D. He then visited Leyden, where the first sketch of his Systema Naturæ was printed in 1735 in the form of tables, filling twelve folio pages. The Systema Naturæ, which embraced the three kingdoms of nature, went through twelve editions within thirty years. Each new edition was enlarged and corrected. The second edition, in 1740, contained eighty pages; the sixth, in 1748, had 283; the tenth, in 1754, consisted of three volumes; and the twelfth, in 1766, had four. He became acquainted with John Frederick Gronovius, Boerhaave, and John Burmann of Amsterdam; and in 1736 published a work entitled Fundamenta Botanica, exhibiting the basis of his botanical system. Mr. Clifford, a rich merchant of Amsterdam, made him superintendent of his garden at Hartecamp, near Haarlem, rich in curious exotics, of which Linné drew up a systematic catalogue. In 1736 he made a visit to England. He returned to Holland with many new plants for Mr. Clifford's garden, his description of which, entitled Hortus Cliffortianus, 1737, with thirty-seven plates, was now published in a most splendid form. He also published the first edition of his Genera Plantarum. In 1738 he made an excursion to Paris, and towards the end of that year returned to his native country, and settled as a physician at Stockholm. At first he experienced neglect, but through the influence of Count Tessin he was appointed physician to the navy, and had a salary for giving public lectures on botany in the summer, and on mineralogy in the winter. The establishment of the Royal Academy of Stockholm, of which he was one of the first members, contributed to the advancement of his reputation, by the opportunities which it afforded for the display of his abilities. In 1741 he succeeded Roberg in the professorship of medicine at Upsala, to which was added the superintendence of the botanic garden, to the new arrangement and augmentation of which he devoted much of his time and attention. In 1745 appeared his Flora Suecica, and the next year his catalogue of Swedish animals, entitled Fauna Suecica. He was elected to the post of secretary of the Academy of Sciences at Upsala. In 1746 an honorary medal of him was struck at the expense of some noblemen, and in 1747 he was nominated royal physician. Through his influence many young naturalists were sent to explore various countries; and to his zeal in the cause of science we owe the discoveries in natural history made by Kalm, Osbeck, Hasselquist, and Loefling. He was employed by the Queen of Sweden to describe her museum at Drottningholm, when he made a new scientific arrangement of the shells contained in it. About 1751 he published his Philosophia Botanica, and in 1753 his Species Plantarum, containing a description of every known plant, arranged according to the sexual system. This work of Linné, which Haller terms his *maximum opus et æternum*, appeared originally in two volumes 8vo; but the edition published by Willdenow at Berlin, 1799–1810, is extended to ten volumes. In 1753 this great naturalist was created a knight of the Polar Star—an honour never before bestowed on a literary man. In 1757 he was elevated to the rank of nobility. Literary honours were also conferred on him by scientific societies in foreign countries. Linné acquired a moderate degree of opulence, sufficient to enable him to purchase an estate and mansion at Hammarby, near Upsala, where he chiefly resided during the last fifteen years of his life. There he had a museum of natural history, on which he gave lectures, and to which he was constantly making additions from the contributions of travellers and men of science in various parts of the world. His health during a great part of his life enabled him to pursue his researches with vigour and activity, but in May, 1774, he had an apoplectic attack, which obliged him to relinquish the most laborious part of his professorial duties, and close his literary labours. A second attack occurred in 1776, and he afterwards experienced a third; but his death did not take place till January 11, 1778. Besides his works on natural history he published a classified Materia Medica, and a systematic treatise on nosology, entitled Genera Morborum. The observations of Linnæus, and the popularity of his writings, have rendered invaluable service to natural science. The simplicity of his system of botanical classification, founded on the sexual relations of plants, gave it an immense popularity, which its intrinsic merits were not fitted to sustain; and while he had the good fortune to see it almost universally recognized by scientific men in his own lifetime, he also lived to acknowledge the value of a classification founded on a more extended observation of all the organs of plants, by which it has been superseded. Charles XIV., king of Sweden, in 1819 ordered a monument to be erected to him in his native place. By his wife, the daughter of a physician at Fahlun, he had a son and four daughters. The former, CHARLES VON LINNÉ, Jun., was joint-professor of botany, and afterwards of medicine at Upsala. He was well acquainted with science, but distinguished himself by no discoveries of importance. On his death, without issue, in 1783, the family became extinct.—ELIZABETH CHRISTINA VON LINNÉ, one of the daughters of the great naturalist, studied botany, and became known by her discovery of the luminous property of the flower of the Tropæolum, of which an account was communicated to the Academy of Stockholm.

LINNET. See FINCH.

LINOLEIC ACID. This acid is one of the constituents of linseed-oil. It is got from the oil by

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saponifying it with soda, separating the soap, and decomposing it with chloride of calcium. After washing, the soap is treated with ether, which dissolves the linoleate of calcium. This salt is next decomposed with hydrochloric acid, and the linoleic acid taken up by ether. After distilling off the ether the oily acid remains, which is converted into a barium compound which is purified by crystallization, and from this the acid is finally got by addition of sulphuric acid. It is a pale yellow oil, insoluble in water, but readily soluble in ether. It is lighter than water, has a slight acid reaction and harshish taste. Exposed to the air it gradually absorbs oxygen and becomes tough. In its reactions with heat, and with nitric acid and other reagents, it is different from oleic acid. It reacts with metallic compounds, and forms salts which are for the most part insoluble in water and are rather difficult to crystallize.

LINSEED-OIL. This oil is got from the seeds of *Linum usitatissimum* either by pressure in the cold or by heating to about 200° Fahr. It is of a pale to dark yellow colour; may or may not have a smell; has specific gravity from 0·928 to 0·94; and remains liquid even at zero Fahr. It is sparingly soluble in alcohol, but readily in ether. It consists of palmitin, stearin, and linolein, and when saponified yields a soft soap from which the characteristic linoleic acid (which see) can be extracted. When exposed to the air it absorbs oxygen and dries up to a tough transparent mass; on this account it is called a drying oil. The drying property is much intensified by boiling, either alone or with a certain proportion of litharge, part of which is retained by the oil. It is this property which makes linseed-oil so valuable as a vehicle in painting. A similar effect is produced by oxide of manganese and by chalk. It cannot be distilled without decomposition—the products vary according to circumstances, but a tough, dark, resinous substance is generally one of the results. Linseed-oil dissolves sulphur, forming the balsam of sulphur, chlorine, iodine, and bromine; but in all these cases there seem to be chemical transformations; and the same is the case with nitric acid and other reagents. Linseed-oil is largely used in the arts, for painting, for printers' ink, &c.; and in medicine, especially for burns. When linseed-oil is mixed with an equal quantity of lime-water a thick liniment is formed which should be painted over the burned part. It excludes the air and soothes the pain.

LINT, in surgery, is the scrapings of fine linen, used by surgeons in dressing wounds. It is made into various forms, which have different names, according to the difference of the figures. Lint made up in an oval or orbicular form is called a *pledget;* if in a cylindrical form, or in shape of a date or olive stone, it is called a *dossil.* These different forms of lint are required for many purposes; as, 1, to stop blood in fresh wounds, by filling them up before the application of a bandage; though if scraped lint be not at hand a piece of fine linen may be torn into small rags, and applied in the same manner; in very large hæmorrhages the lint or rags should be first dipped in some styptic liquor, as alcohol or oil of turpentine, or sprinkled with some styptic powder: 2, to agglutinate or heal wounds; to which end lint is very serviceable, if spread with some digestive ointment, balsam, or vulnerary liquor: 3, in drying up wounds and ulcers, and forwarding the formation of a cicatrix: 4, in keeping the lips of wounds at a proper distance, that they may not hastily unite before the bottom is well digested and healed: 5, they are highly necessary to preserve wounds from the injuries of the air.—Surgeons of former ages used compresses of sponge, wool, feathers, or cotton, linen being less plentiful than in later times; but lint is far preferable to all these, and is at present universally used.

LINZ, the capital of Upper Austria, beautifully situated on the right bank of the Danube, here crossed by an iron lattice bridge (800 feet long) on the railway from Budweis to Gmünden. It consists of the town proper and two suburbs, one of them on the opposite side of the river; and is defended by a circle of detached forts extending over a circuit of 9 miles. It is well built, containing several handsome streets and two squares, one of them large and elegant, and adorned in its centre by two fountains surmounted by figures of Jupiter and Neptune, between which there has been rather incongruously placed a monumental column to the Holy Trinity, erected in remembrance of a visitation of the plague. Its principal public edifices and establishments are, the old cathedral, flanked with two towers; the new cathedral in course of construction; the town church, and the Matthias and Capuchin Church, containing the monument of Montecuculi, who died here; the Landhaus, originally a Franciscan convent, now the place of meeting for the Estates of Upper Austria; the Schloss, on a height facing the Danube, anciently the palace of the Austrian dukes, but now converted into barracks; the town-house, bishop's palace, seminary, gymnasium, an Ursuline convent, a lyceum, with library and good collection of philosophical apparatus; a normal high-school, a school of design, and various other schools; a museum, a theatre, two infirmaries, a lunatic asylum, and other benevolent institutions. The manufactures consist chiefly of tobacco, woollen, linen, silk, and cotton goods; beer, leather, locomotives, machinery, hardware, &c.; and there is an extensive trade on the Danube. Linz, as the seat of the government of Upper Austria, has many important public offices, is also the see of a bishop, and has several associations for art, music, &c. It was originally a Roman station; from the tenth to the twelfth century it belonged to the house of Kyrnberg, from which it was purchased by Duke Leopold IV. It has since remained with the house of Austria. The most remarkable event in its modern history is the construction of the great chain of forts mentioned above. The beauty of the environs, its educational institutions, and the superiority of its society make it a favourite place of residence. Pop. (1880), 41,687.

LION (see Pl. XXIX.–XXX. figs. 1, 2, and 3). The 'king of beasts' forms a very typical member of the great carnivorous order of mammals, and stands as the chief representative of the family Felidæ or Cats. The dental arrangement comprises six incisors and two canines in each jaw; the false or pre-molars number six in the upper, and four in the lower jaw; and the true molars are two in each jaw. The molars are fewer in number in the Felidæ than in other Carnivora. The last molar in the upper jaw is tuberculate, all the other molars are trenchant. The '*carnassial* or flesh' tooth—the last tooth but one in the upper, and the last tooth in the lower jaw—of the upper jaw has three lobe-like cutting surfaces, and a blunted 'heel' or internal point; and the carnassial in the lower jaw has two cutting lobes or surfaces, but is destitute of a blunted inner lobe. There is a small tubercle-like tooth behind each flesh-tooth of the upper jaw, this being the last molar; but in the lower jaw there are no teeth behind the single molars, which form the lower flesh teeth. The jaws are short, and the muzzle in consequence is rounded. The legs are of nearly equal size, the fore-feet being provided with five toes, and the hind-feet with four only. The toes are furnished with powerful curved claws, which can be retracted within sheath-like pouches of the skin, and are thus

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saved from being worn or blunted. The last joint of the toe, to which the claw is attached, can be retracted upon the preceding joint, or lodged by its side, by the action of two strong elastic ligaments; whilst when it is to be protruded, the flexor tendon, or that which bends the toe, draws it forward ready for use. Like all other Felidæ the lion is digitigrade, that is, walks upon the tips of the toes. The heel, small in this family, is raised from the ground, together with the greater portion of metacarpus and metatarsus. The walking surface of the foot is besides provided with hairy elastic pads or cushions, upon which these animals move about with noiseless tread; these structures are also of use in breaking the shock of the leaps which these forms are accustomed to make in springing upon their prey. The tongue is provided with papillæ of a horny structure; the presence of these bodies giving to the tongue the character of a powerful rasp, serviceable in scraping the flesh from the bones of their prey. The great muscular development of the lion and his neighbours may lastly be noted, in concluding the consideration of the general distinctive characters of the genus. This muscular development is indicated in the skeleton by the presence of strong bony ridges for the attachment of muscles; these ridges being well seen in the skull and bones of the limbs. The outward form and appearance of the lion species is familiar, and readily recognized, especially in the male animals. The large size of head, chiefly given to it by the great mane which covers the head, neck, and shoulders of the males; the uniform, unmarked, tawny colour of the skin; and the tuft at the extremity of the tail, are the distinctive characters of the lions. The reputation for certain admirable traits of character and disposition in the lion, has been founded chiefly upon his striking appearance, and upon tales told without any verification. The truth is that the lion is endowed with all the fierce, insatiable instincts of the cat tribe, and wherever he has been held to be courageous his immense strength has made him so; and his apparent mercy or forbearance has simply arisen from the fact of his wants and hunger having been duly satisfied, or when under the dominion of man of permitting his keeper to approach him without injury. In distribution the lion appears now to be much more limited than in former years. In geological periods these animals had a wide range over Europe, but even since historical periods the distribution of the genus has decreased in extent. The African continent forms the head-quarters of the lions, and in Southern Asia—in India, Persia, and Arabia—they are also found. America totally wants evidence of any geological or historical lion—the Puma (*Felis concolor*) supplying its place in the New World. The African Lion (*Leo Africanus* or *Felis leo*) is the most familiar species—if, indeed, the few known lions differing from each other in minor points, not always to be determined, are to be considered different *species*. The *specific* nature of these forms is of doubtful existence, and it seems more correct to consider that there is but one species—the typical *Felis leo* or *Africanus*—and that other lions are mere varieties of this one species. The African lion has long formed the typical specimen of the tribe. It extends all over the African continent, but exhibits certain variations throughout that large area. Thus, the Barbary and Cape Lions vary a little in colour and size, the former being generally the larger; and even the Cape or South African forms appear to present variations in colour, one being paler in colour than the other, and hence these latter forms become divisible into the *pale* and *black* lions. The Maneless Lion of India (*Leo goojratensis*) presents a distinct feature from the other forms, in that the males want the characteristic mane of the other varieties. And amongst the lions generally, the differences upon which the formation of distinct species have been founded have a chief reference to the development and form of the mane in the various kinds. The period of gestation in the lions is five months. Only one brood is produced annually, and from two to four young are produced at a birth. The mother nourishes the whelps for about a year; their size at birth being about that of a pug-dog. In their young state the whelps may be marked with various markings; brown bands upon a tawny body colour, being most frequently observed. As they grow older, however, the markings disappear, and the uniform tawny hue of the adult is reached. The mane of the male does not begin to grow until the animal has attained the age of three or three and a half years. The adult age is reached in the males at seven, and in the females at six years. The probable limit of age of the lion has been differently stated by different writers. Buffon fixes it at twenty-two years. But a lion which died in the Tower of London in 1760, had lived in captivity above seventy years; and another died in the Tower at the age of sixty-three. The habits of the lion will be familiar to most readers. The lurking-place is chosen near a spring, or by the sides of a river, where, concealed among the brushwood, he lies in wait for the animals coming to drink. A single powerful leap generally lands him upon his prey; but if unsuccessful, he retires to wait a second opportunity. In the night-time the lion appears more active, and prowls about in search of prey; and in the dark even ventures near man's domain, and carries off domestic animals. In stormy nights also the lion appears active, and takes advantage of the panic produced by the storm among the other inhabitants of the forest, to spring upon and seize them unawares. The conformation of the eyes in enabling the lion to see well at night, aids him greatly in his marauding expeditions. The roar of the lion has often been alluded to and described by travellers as being exceedingly terrific. The roar is his natural voice, and is made by a prolonged effort, resulting in a deep-toned grumbling mixed with a sharper grating noise. When enraged the cry of the lion is a sharp, short, repeated, and somewhat shrill cry. The statement that the lion roars at stated periods appears to be almost wholly without foundation; in summer alone, and especially before storms, &c., and atmospheric changes, the lion roars before dawn. In rage the lion beats his sides with his tail, agitates his mane and facial muscles, protrudes the tongue and claws, utters the peculiar sharp, frequent growl, and altogether presents a very terrific appearance. About 15 lbs. of flesh per diem is stated as the average requirement of a lion. These forms appear to drink frequently, lapping the water like dogs. The odour of the breath is offensive, and the urine has a very fœtid smell. Whilst the distribution of the lion has become more limited than in former years, the actual number of lions has also apparently decreased. From Libya, whence the Romans obtained so many, and from Greece, where, according to Aristotle, they once occurred, lions have completely disappeared. In the arenas of ancient Rome, large numbers of lions were frequently exhibited. Sylla, the dictator, once exhibited 100 of these animals, and Pompey presented 600 in the circus. Lion fights were common during the consulate, and during the empire also. Hadrian, it is said, caused 100 to be destroyed at one exhibition, and others of the emperors and consuls were equally prodigal. Lions are hunted, chiefly in Africa, for the sake of their skins, and also for the purposes of extermination. They are hunted by dogs, from ten to sixteen

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of those animals overcoming a lion of large size. Among the native Bushmen the poisoned arrow and gun are used in the pursuit. The antelopes are watched, and if they are perceived to be alarmed, the conclusion is that a lion has been in the vicinity; and marking the spot as a guide, the foe is tracked to his lair, in which at mid-day he is found asleep, and is thus taken unawares. Sometimes, however, he is fairly brought to bay in the daytime by the hunter, as the following account from Pringle testifies. After his retreat is found, 'the approved plan is to torment him with dogs till he abandons his covert, and stands at bay in the open plain. The whole band of hunters then march forward together, and fire deliberately one by one. If he does not speedily fall, but grows angry, and turns upon his enemies, they must then stand close in a circle, and turn their horses' rear outward, some holding them fast by the bridles, while the others kneel to take a steady aim at the lion as he approaches, sometimes up to the very horses' heels, crouching every now and then as if to measure the distance and strength of his enemies. This is the moment to shoot him fairly in the forehead, or some other mortal part. If they continue to wound him ineffectually till he becomes furious and desperate, or if the horses, startled by his terrific roar, grow frantic with terror, and burst loose, the business becomes rather serious, and may end in mischief, especially if all the party are not men of courage, coolness, and experience.' Very full accounts of the lion and his habits are to be found in the travels of Sparmann, Barlow, Levaillant, Burchell, Du Chaillu, Baker, Speke, Grant, Gordon Cumming, Livingstone, &c.

LIPARI ISLANDS, a cluster of volcanic islands in the Mediterranean, which take their name from the principal one of the group, about 24 miles from the N. coast of Sicily, situated between lat. 38° 20′ and 38° 55′ N.; lon. 14° 15′ and 15° 15′ E.; and comprised in the department of Messina. Pop. about 22,000. These islands were called by the ancients *Æolicæ*, *Vulcanicæ*, and *Insulæ Liparœorum*, and feigned to be the residence of Æolus and Vulcan. Lipari, the largest, is populous and well cultivated, producing great quantities of corn and fruit, especially figs, grapes, and raisins; it likewise produces alum, sulphur, nitre, and cinnabar. It is about 15 miles in circumference; the air is healthy, the inhabitants industrious, and the males good sailors. In this island were formerly pits which emitted fire and smoke, but have long ceased to do either. On the eastern coast is situated a town of the same name, containing a castle built by Charles V., a cathedral, a college, several convents, and an hospital. A considerable trade is carried on here in the principal produce of the island. The other islands are Stromboli, Panaria, Vulcano, Salini, Alicudi, and Felicudi, with two or three smaller ones. The volcanic eruptions, formerly frequent in the island of Lipari, ceased in the sixth century; but the whole island is composed of pumice-stone, lava, volcanic glass, and black sand; and the warm baths and heated vapours of the stoves (excavations which emit hot sulphureous exhalations) prove the activity of the subterranean fires. Stromboli is at present the most remarkable of the islands; its fires are in unremitting activity, the eruptions taking place at regular intervals, varying from three to eight minutes.

LIPETZK, a town of Russia, in the government of Tambov, and 80 miles W.S.W. from the city of that name, on the Voronej. A mineral spring in the neighbourhood, over which a building was first erected by Peter the Great, is much frequented. Pop. 14,239.

LIPOGRAMMATIC COMPOSITIONS, those in which certain letters are purposely left out. Thus, Lope de Vega wrote a *novella* without *l* or *a*. Kotzebue wrote one without *r*. The word is derived from the Greek *leipein*, to omit, and *gramma*, a letter.

LIPPE, or less correctly LIPPE-DETMOLD, a principality of Germany, bounded north, west, and south by Rhenish Prussia, and east by Hanover, Schaumburg-Lippe, and Hesse-Nassau; area, 438 square miles. It lies on the Teutoburger Wald, and is covered almost throughout by mountains and hills, which divide it into three small basins; one in the north belonging to the Weser, which drains it by the Werra, Bega, and Exter; another belonging to the Ems, and the third belonging to the Rhine, which receives its waters by the Lippe. In the south-west, where both the Lippe and Ems rise, there are several lakes. The climate is mild, but humid, and hence mists are frequent. Some parts of the surface are waste, or fit only for pasture, on which considerable numbers of cattle are reared; but others are fertile, producing much corn, rape, hemp, and flax. The mountains are generally well wooded. The principal metal is iron, and there are good quarries of limestone and gypsum, and some valuable saline springs. Weaving is the chief branch of industry, though there are also glass-works, several paper and numerous saw mills. The principal exports are wood, thread, linen, and wool. For administrative purposes it is divided into twelve bailiwicks, of which Detmold is the capital. The other chief towns are Lemgo and Horn. Since 1836 the government has been constitutional; it is now a member of the German Empire, and sends one member to the Bundesrath, and one to the Reichstag. A very large majority of the inhabitants are Protestants of the Reformed or Calvinistic church. The ancestors of the present governing family had large possessions in Westphalia in the twelfth century. Bernard VIII. (died 1563) was the first Count of Lippe. Simon VI., who died in 1613, left three sons, the eldest of whom was the ancestor of the present princely line, the second founded the line of Brake (extinct in 1709), and the third the line of Bückeburg, now the ruling family in Schaumburg-Lippe. Pop. (1880), 120,246.

LIPPI. There were three Florentine artists of this name, whose works have come down to us. Of these the eldest, FRA FILIPPO DEL CARMINE, born in 1412, and surnamed *the Old*, had taken the vows as a Carmelite monk; but afterwards abandoned the church, and underwent many vicissitudes of fortune. On one occasion he fell into the hands of a Barbary corsair, who sold him to slavery in Africa. The successful exertion of his talents upon the portrait of his purchaser was rewarded by his restoration to liberty. On his return to Italy he was received into the service of the Grand-duke of Florence. His death took place in 1469, and is said to have been the result of an intrigue with a female of a respectable family, poison being employed by her relatives for his destruction. He left one son, FILIPPO, also a painter of considerable reputation, born at Prato in 1460. Many of his works are yet to be found in Florence. He died in 1505.—LORENZO, the third of the name descended of the same family, united to considerable skill as an historical and portrait painter the arts of poetry and music. He was born in 1606, and is advantageously known as the author of a burlesque poem, entitled Malmantile Racquistato. Of this work there have been three editions, two printed at Florence in 1688 and 1731, the other in 1768 at Paris. It appeared originally under the fictitious name of Zipoli. His death took place in 1664.

LIPPSTADT, a town of Westphalia, Prussia, in the government of Arnsberg, 24 miles N.N.E. of the city of that name. It is situated on the left bank of the Lippe, and is the capital of the circle of its own

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name. It is walled, has five gates, a court of law, and several public offices; manufactures of woollens, leather, and starch, and a trade in corn and linen. Prior to May, 1850, a portion belonged to Lippe-Detmold. Pop. (1880), 9349.

LIPSIUS, JUSTUS (*Joest Lips*), an acute critic and erudite scholar of the sixteenth century, was born in October, 1547, at Overysche, in Brabant, a village situated between Brussels and Louvain. Martinus Lipsius, the intimate friend of Erasmus, was his uncle. His genius developed itself very early, his memory being considered wonderful. Before he had completed his ninth year he had written some miscellaneous poetry much above mediocrity. He was instructed at Brussels, and subsequently in the colleges of Ath, Cologne, and Louvain. He removed to Rome in his twentieth year, and having secured the patronage of Cardinal Granvella, by dedicating to him his treatise Variarum Lectionum, was received into his household in the nominal capacity of secretary. With this distinguished prelate he remained till 1569, sedulously consulting the treasures of the Vatican and other principal libraries, especially employing himself in the collation of rare and ancient manuscripts. On his return to the Netherlands, after a short time spent at Louvain, he visited the capital of the German Empire, and then accepted a professorship in the University of Jena (1572). Here the fickleness of his disposition, and the vacillating state of his opinions respecting religious matters, which eventually fixed the imputation of imbecility on a character in other respects estimable, first became apparent. He renounced the Romish Church, and became a Lutheran; but quitting Jena at length, with an avowed intention of spending the remainder of his life in retirement in his native country, he repaired to Overysche, and soon after recanted his supposed errors, and became reconciled to the see of Rome. In 1577, however, he again removed to Leyden, when he embraced the doctrines of Calvin, and during the thirteen years which he spent in that university gave to the world the most esteemed of his works. In 1590 he returned finally to Louvain, and once more became a Catholic, and that of the most bigoted description. Many tempting and honourable offers were made him by various potentates to engage him in their service; but he refused them all, and at length died at Louvain in the spring of 1606. Superstition led him a short time before his death to dedicate a silver pen and his fur gown to the Virgin Mary. His principal works are the Variarum Lectionum libri iii., above mentioned; a Commentary on the Works of Tacitus; treatises De Constantia, De Militia Romana, De Amphitheatris, De Pronunciatione recta Linguæ Latinæ, De Cruce, De una Religione, De Bibliothecis, Satira Menippæa, Saturnalia, and an Oration on the Death of the Duke of Saxony. The best edition is that of Antwerp (1637).

LIQUATION, or ELIQUATION, the name of a process used in metallurgy to separate more from less fusible metals. Thus in the refining of tin to remove slag, iron, copper, and other metals, the ingots are heated in a reverberatory furnace to a temperature just sufficient to melt the tin, which is allowed to run into a basin, while the impurities are left behind on the hearth. A similar process is employed in extracting silver from copper ores. The copper ore, or the black copper, is fused along with a considerable excess of lead, and this alloy is cast into round thin cakes. The cakes are then set edgewise upon a trough sloping towards the centre. Beneath this is an arched space with a gutter; a fire is lighted round the discs, which are inclosed by iron plates, and as the lead melts it takes up the silver and flows down into the gutter, leaving the disc of copper in a porous state, and still holding a proportion of the lead and a much reduced quantity of silver. The argentiferous lead is afterwards subjected to cupellation or pattinsonizing. See LEAD.

LIQUEFACTION OF GASES. Faraday showed that there is no broad distinction between gases and vapours; the difference in their natures is one of degree merely, a vapour being in reality a gas near its temperature of liquefaction. He liquefied cyanogen, ammonia, chlorine, carbonic acid, and many other gases by placing a mixture, which when heated evolves the gas, in the longer limb of a strong bent tube of glass, and after hermetically sealing the tube immersing the shorter limb in a freezing-mixture. The gas was evolved in a very confined space, and was therefore subjected to great pressure as well as diminution of temperature, conditions generally sufficient to liquefy it. He found, however, that there were certain temperatures at which no pressure however great would liquefy a gas. He came to the conclusion that – 110° C. was too high a temperature for the liquefaction of oxygen, hydrogen, and nitrogen. The following table is principally due to Faraday:—

	Temperature of Solidification.	Temperatures (Centigrade and pressures in atmospheres) of liquefaction.				
		At – 20°.	At 0°.	At 15°.5.	At 1 atm.	
Sulphurous anhydride	– 76° C.	0·72	1·53	2·54	– 10°·5 C.	5·16 at 38° C.
Cyanogen	– 34°·4	1·25	2·37	..	..	4·00 at 17°·2
Hydriodic acid	– 51°	2·9	3·97	5·86	..	..
Ammonia	– 75°	2·48	4·4	6·90	– 33°·7	10·00 at 26°·3
Sulphuretted hydrogen	– 85°·5	6·7	10·0	..	..	14·60 at 11°·1
Nitrous oxide	– 101°	19·3	32·0	..	– 87°·9	33·40 at 1°·7
Carbonic anhydride	– 56°·7	22·8	38·5	..	– 78°·2	..
Silicic fluoride	– 140°	..	..	..	..	..
Chlorine	..	..	..	..	..	..
Olefiant gas	..	27·2	..	..	..	..
Hydrochloric acid	..	15·0	26·20	..	..	40·00 at 10°

For a considerable number of years there were certain gases that continued to resist all attempts to liquefy them, so that it was common to speak of them as the permanent gases. These were five in number up to 1877, but towards the end of that year two of them, namely carbonic oxide and carbon dioxide, were reduced to the liquid state by the efforts of M. Cailletet, an ironfounder of France. The three gases that still resisted the efforts of science were oxygen, hydrogen, and nitrogen, but these, as well as atmospheric air, were also in a very short time obtained in the liquid state. The name of M. Pictet of Geneva as well as that of M. Cailletet is associated with this remarkable result, which has been arrived at by the use of enormous pressure combined with excessive cold. M. Cailletet's apparatus consists essentially of a tube resting in a massive steel cylinder full of mercury, the cylinder being surrounded by a freezing-

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mixture; strong hydraulic pressure compresses the gas to be experimented on into the tube, and when subsequently allowed suddenly to expand into the air the absorption of heat on the change of condition is so great as to condense a portion to the liquid state. M. Pictet subjected hydrogen to the enormous pressure of 650 atmospheres and to a cold of perhaps −170°C., and thus obtained a jet of liquid hydrogen of a steel-blue colour.

Dr. Andrews has conducted a series of fine experiments for the examination of carbonic acid and other gases under varied circumstances of pressure and temperature. A long capillary tube, closed at one end, contained a quantity of pure carbonic acid or other gas; a short thread of mercury in the tube indicated by its position the volume of the gas; the open end of the tube communicated with a very strong copper or wrought-iron vessel completely filled with water. A second capillary tube of about the same length contained a quantity of dry air. The positions of the mercury threads (and therefore the volumes of the gas and of the dry air) were observed by means of a cathetometer. When a fine steel screw was screwed into the vessel the water was subjected to pressure, and the mercury threads rose in the capillary tubes. It is known that dry air obeys Boyle's law almost perfectly, so that its compression in the second tube indicated the pressure to which the other gas was being subjected. With this apparatus Dr. Andrews subjected gases to pressures of 600 atmospheres or more, and to a cold of −100° C. by surrounding the tubes with freezing-mixtures. It is found that no gas accurately obeys Boyle's law; gases obey it more readily as they are further removed from their temperatures of liquefaction; the more readily condensable gases, sulphurous acid, &c., obey it very imperfectly.

LIQUEUR (the French name), a palatable spirituous drink composed of water, alcohol, sugar, and some aromatic infusion extracted from fruits, seeds, &c. The great difference in the qualities of the different liqueurs is owing principally to a variation in the proportions of the sugar and alcohol. The French distinguish three qualities: the first are the *ratafias* or simple liqueurs, in which the sugar, the alcohol, and the aromatic substance are in small quantities: such are the anise-water (see ANISE), *noyau*, the apricot, cherry, &c., ratafias. The second are the oils, or the fine liqueurs, with more saccharine and spirituous matter, as the *anisette*, *curaçao*, &c., which are those commonly found in the *cafés*. The third are the creams or superfine liqueurs, such as *rosoglio*, *maraschino*, Danzig water, &c. The same aromatic infusion may therefore give its name to liqueurs of different qualities in which the materials are the same, but the proportions different; thus one proportion of ingredients gives *eau-de-noyau*, another *crême-de-noyau*, &c.

LIQUID. See MATTER; MATTER (CONTINUITY OF THE STATES OF); DIFFUSION OF LIQUIDS; HYDRAULICS; HYDROSTATICS; TENSION OF LIQUID SURFACES: &c.

LIQUIDAMBAR STYRACIFLUA, or SWEET GUM (natural order Altingiaceæ). This tree is widely diffused through America, from lat. 43° to Florida, and along the shores of the gulf into the provinces of Mexico. The leaves are five-lobed, and the lobes are serrated on the margin. The flowers are inconspicuous. The fruit consists of a sort of cone supported on a long pedicle. Some trees have a trunk 5 feet in diameter, and proportional height. The usual diameter, however, is from 1 to 3 feet. The wood is compact, capable of receiving a fine polish, and has been used for articles of furniture. The bark on being wounded yields a small quantity of a fragrant resin, known popularly as 'liquid *storax*,' or styrax. It contains benzoic acid. Most of the liquid storax used in Britain is obtained from Trieste, and is probably collected from *L. Orientale*, the lord-wood of the Cypriots. In the Malayan Archipelago the same substance is yielded by *L. altingia*.

LIQUIDS, COMPRESSIBILITY OF. It was long supposed that liquids were perfectly incompressible. In the Florentine experiment a hollow globe of gold or lead was filled with water and the hole soldered. When the globe was crushed, so that its volume was diminished, some water forced its way through the metal and appeared like dew on the outside. Œrsted disproved the conclusions drawn from the Florentine experiment. His *piezometer*, which was a bulb at the end of a graduated capillary tube, was nearly filled with water, a small thread of mercury being at the end of the column of water in the tube. The relative volumes of the bulb and tube were known. The piezometer, along with a small air manometer, was surrounded with water inside a strong glass vessel. The water filled the vessel, and might be subjected to great pressure by means of a screw. When the screw was turned the position of the mercury thread showed the water in the piezometer to be compressed; and comparison with the manometer enabled the compressibility to be found. Œrsted's method is not exact enough. The following results are those of Grassi, who employed Regnault's improvement on Œrsted's method. The pressure of one atmosphere caused

Mercury at 0° C.	to shrink	3	millionths	of its volume.
Water at 0° C.	,,	50	,,	,,
Water at 41°·6 C.	,,	44	,,	,,
Ether at 0° C.	,,	111	,,	,,

LIQUORICE (*Glycyrrhiza*), a genus of leguminous plants, having pinnated leaves, and small blue, violet, or white flowers, which are disposed in heads or spikes. The common liquorice (G. *glabra*) grows wild in the south of Europe, and is cultivated in many places, even in Britain, for the sake of the root, which is much used in pharmacy, and forms a considerable article of commerce. Large quantities of the extract of the roots are imported from Italy, either cast in the form of short sticks, and called Spanish liquorice or liquorice juice, or else in the form of an extract run into boxes of about 2 cwts. each. Much of the large quantity imported is used by the brewers in the manufacture of porter. Liquorice juice is often administered medicinally in coughs and pulmonary affections, and the aqueous infusion is used as a refreshing beverage. A deep, light, and sandy soil is best adapted to its culture.

LIRA, in the plural LIRE, derived from the Latin *libra*, pound, is the name given to a silver coin of the value of about 9½*d*. English money, and of the same weight and fineness as the French franc. It is the basis of the Italian monetary system; the gold coins are pieces of 100, 50, 20, 10, and 5 lire, and the copper coins are pieces of 1, 3, and 5 centimes, or hundredth parts of a lira.

LIRIA, a town of Spain, in the province and 17 miles north-west by west of Valencia, on the left bank of the Guadalaviar. It is well built, consisting of several spacious streets and squares, and has two churches, one of them a handsome modern structure, a town-house, hospital, and several schools. The monastery of San Miguel, a large antique pile, with a richly-decorated church, crowns a hill in the vicinity. Pop. 9575.

LIRIODENDRON. See TULIP-TREE.

LISBON (Portuguese, *Lisboa*), the capital and principal seaport of Portugal, on the right bank of the Tagus, about 9 miles above its mouth. It is built

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on a succession of hills, rising more or less abruptly from the quays in the form of an amphitheatre, and exhibits an extensive assortment of churches, convents, and houses of dazzling whiteness, which have an imposing effect when viewed from the river. The streets of the older parts in general, and more especially in the east, which is the oldest portion of the city, are steep, narrow, crooked, badly paved, and very filthy; and the houses, with exception of a neat and substantial building here and there, are old-fashioned and mean. That part of the town, however, which has been rebuilt since the great earthquake in 1755, and which lies on even ground, in the valley between the Monte do Castello on the east, and the hills of San Francisco and Do Carmo on the west, consists of several parallel streets crossed by others at right angles, and is regular, well built, and kept at least decently clean. Of these the streets called Do Ouro (Gold), Do Prato (Silver), D'Augusta, Do Chiado (Cloth), the latter the fashionable rendezvous, extend about ½ mile, north to south, having at their southern extremity the Praça do Commercio, a large and handsome square, surrounded on three sides by the naval arsenal, the exchange, custom-house, India-house, and other public buildings, and having the Tagus on the south, with an equestrian statue of Joseph I. in bronze in the centre. At the northern extremity of these streets are the Praça da Figueira, a square of a remarkably picturesque appearance, used as a public market, and a handsome square called the Rocio containing a magnificent national theatre erected on the site of the former Inquisition. The only other open spaces and squares worthy of particular notice are the Passeio Publico, or promenade, which although small is elegantly laid out; the fine shady avenue called the Salitre; Praça das Amorciras, contain a large reservoir for supplying the different fountains of the city with water; and Praça de Algeria, in which a sort of rag fair is held. The western quarter, called Buenos Ayres, is airy and pleasant, and chiefly occupied by foreigners. The town of Belem, on the west, beyond the River Alcantara, forms a sort of suburb to Lisbon. It has a well-known tower, forming one of the defences of the harbour. Few cities of Europe are so deficient in ornamental architecture as Lisbon. Excepting the castle of St. George, remarkable for the beauty of its situation, the only other noteworthy buildings, besides those already adverted to, are churches and convents. The principal of the former are the cathedral, once a Moorish mosque, on the slope of the Castle Hill, on the east; the church do Coração de Jesus, surmounted by a splendid dome; the church of the Martyrs, erected on the spot where Alphonso I. mounted the walls of the city and rescued it from the Moors; the handsome church of Santa Engracia, and the church of San Roque. The numerous convents which crown the hills, and appear like palaces and fortresses, are for the most part massive and imposing structures. But unquestionably the most remarkable specimen of architecture of which Lisbon can boast, and one of the greatest works of the kind either in ancient or in modern times, is the aqueduct which conveys water to the city from springs rising near the village of Bellas, about 10½ miles distant. It is partly conducted under ground, but on approaching Lisbon it crosses the deep valley of Alcantara, which is spanned for nearly 2500 feet by a bridge of thirty arches, the loftiest of which is 240 feet high and 110 feet wide. The scientific and literary institutions comprise the Royal Academy of Sciences, founded in the latter part of last century; College of the Nobles; Royal Marine Academy, or school of navigation and ship-building, with its observatory; Royal Academy of Artillery and Engineers; Royal Military College, School of Music, National Library, in the Praça do Commercio, containing about 185,000 vols., and that of the Cortes in the La Convento São Bente, of about 30,000 vols.; the Royal Schools of Vicente de Fora; Royal School of Drawing and Architecture. The places appropriated to public amusement are very few, consisting of the Italian opera-house, the new national theatre, and four other minor houses, and two erections for the exhibition of bull-fights. The harbour, or rather the roadstead, is one of the finest in the world; and the quays, which extend between 2 and 3 miles along the bank of the river, are elegant and commodious. The exports consist chiefly of wine, oil, fruit, and salt; and the principal imports are hemp, flax, corn, silk, linen, cotton, and woollen cloths, iron, steel hardware, dried fish, ale, porter, and coals. In 1874 the imports amounted to £2,655,193, and the exports to £1,834,619; in 1879, imports £3,126,720; exports £1,969,674. The manufactures are tobacco (the staple), silk, paper, chemicals, and soap; there are also sugar-refineries, iron-foundries, and potteries. The goldsmiths and jewellers are highly esteemed.

Lisbon was anciently called *Olisipo. Felicitas Julia* was its name under the Romans. It was captured by the Moors in 716, and remained in their possession till 1147. In 1755 it was visited by an earthquake, which threw down a considerable portion of the city, and destroyed above 30,000 of its inhabitants. It was taken by the French in 1807, but resisted an attack by Masséna in 1809. Pop. (1878), 246,343.

LISBURN, a parliamentary borough and market town of Ireland, in the counties of Antrim and Down, 8 miles south-west from Belfast, on the Ulster railway. It is in general well built, and has altogether a clean and thriving appearance. It has a market-house, court-house, and a parish church, which is also the cathedral church of the united dioceses of Down, Connor, and Dromore, a handsome structure, with a tower and spire, and containing a monument to Jeremy Taylor, who died here in 1667; there are also a neat Roman Catholic chapel, and places of worship for Presbyterians, Methodists, &c., several schools, a county infirmary, and the union poor-house. Flax-spinning and weaving, and the manufacture of thread and muslin, employ the greater number of inhabitants; and there are also extensive bleachfields in the neighbourhood, together with some corn-mills. Lisburn returns a member to Parliament. Pop. in 1881, 11,083.

LISIEUX, a town of France, in the department of Calvados, beautifully situated on the Touques, between two gorges forming the entrance into a rich and beautiful valley, 27 miles E.S.E. of Caen. It consists of narrow, winding streets, and antiquated, decayed, and gloomy-looking wooden houses. Its principal edifices are a fine Gothic cathedral of the twelfth century, with a fine lady-chapel erected by Bishop Pierre Cauchon, to expiate his share in the execution of Joan of Arc; a handsome episcopal palace, a communal college, diocesan seminary, and a theatre. The manufactures consist of muslin, broad-cloth, hair-cloth, flannel, moleskins, ribbons, &c., and there is a considerable trade in corn, fruit, cider, hemp, flax, and cattle. Lisieux figures much in the early and religious wars of France. Pop. (1881), 16,039.

LISKEARD, a municipal and parliamentary borough and market town of England, county of Cornwall, 18 miles north-west of Plymouth, situated principally on steep heights. It has a town-hall, and handsome, commodious markets, small prison, a fine old church, a Roman Catholic chapel, several Dissenting places of worship; a masonic hall, a grammar and other schools, the Devon and Cornwall Bank, and the East Cornwall Savings-bank. Tanning is

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not carried on so extensively as formerly, the prosperity of the town depending principally on agriculture and the tin, lead, and copper mines in the vicinity. A railway runs between the mining districts and Looe, where the produce of the mines is shipped. The borough returns a member to Parliament. Pop. (mun. bor.), 4536; (parl. bor.), 5591.

LISMORE, an island of Scotland, off the west coast of Argyle, and forming part of that county, at the entrance of Loch Linnhe, 8 miles north-west of Oban; greatest length, from north-east to south-west, 10 miles; average breadth, about 1½ mile; area, 15 square miles, or 9600 acres. It forms a long and narrow belt of a somewhat oval form, and has an uneven surface, pierced in many places by abrupt rocks. These, however, as well as almost all the strata, are calcareous; and the soil formed by their decomposition has the double advantage of being both of considerable depth and great natural fertility. The greater part of the island is under regular culture, yielding excellent crops of grain. Timber is deficient, but small clumps, consisting chiefly of sycamore, beech, and ash, are seen in different quarters. In ancient times Lismore was the residence of the bishops of Argyle and the Isles, who were hence frequently styled Episcopi Lismorenses, and the remains of their palace are still seen. Pop. (1881), 621.

LISSA, an island belonging to Austria, in the Adriatic, off the coast of Dalmatia, in the circle of Spalatro, and 17 miles west of the island of Lesina; length, east to west, 10 miles; breadth, 5 miles. The coast generally presents bold, steep cliffs, and is accessible only at a few bays. The interior is almost completely covered by lofty hills. Lissa yields oil and wine of excellent quality. From 1810 to 1815 it was held by the British, who built some fortifications and defeated all the attempts of the French to dislodge them. It thus became an important depot for British goods, which found a large market on the mainland. Pop. 7871.—The town of Lissa, or San Giorgio, on a bay on the north-eastern side of the island, is built picturesquely in the form of an amphitheatre. Its fisheries yield annually large quantities of sardines. It was attacked by the Italian fleet on August 18 and 19, 1866, and on the 20th an engagement took place between the Italian and Austrian fleets, in which the Italians were defeated. Pop. 4317.

LISSAJOUS'S EXPERIMENTS. A ray of light is reflected from the limb of an upright tuning-fork unto the limb of a horizontal tuning-fork, and thence to a screen, a point of which it illuminates. When the tuning-forks vibrate, if they are perfectly in unison, the spot on the screen describes a straight line, or a circle, or an ellipse. If a small weight be attached to the limb of one of the forks, the path of the spot of light will change rapidly in form. If one fork is the octave of the other the path is some modification of the figure of 8. As the interval between the forks is made 1:3, 2:3, 3:4, 4:5, &c., the illuminated path on the screen becomes more and more complex in form. It is evident that the phenomena here described are of the same kind as those of the kaleidophon (which see).

LISSENCEPHALA (Greek, *lissos*, smooth; *egkephalos*, brain). One of the four divisions of the class Mammalia, according to Owen, who in this classification takes the structure of the brain as the basis of his arrangement. The Lissencephalic mammalia include the Cheiroptera (bats); the Insectivora (moles, &c.); the Rodentia (rats, mice, beavers, &c.); and the Edentata (sloths, armadillos, &c.) These orders are thus grouped together from presenting a series of similar characters in the conformation of the brain; these characters being, firstly, the generally smooth nature of the cerebral hemispheres, the folds, if present, being few in number; secondly, the cerebellum or lesser brain and part of the olfactory lobes are left uncovered by the cerebrum or brain proper; and thirdly, the presence of a corpus callosum, or transverse band of nervous matter which connects the hemispheres or halves of the cerebrum. The other divisions of Owen's mammalian classification are the *Lyencephala* (which see), including the kangaroos, the *Gyrencephala*, including the whales, Carnivora, ungulates and monkeys; and the *Archencephala*, including man alone.

LISTON, JOHN, a celebrated comedian, was the son of a London watchmaker, and born in Norris Street, Haymarket, in 1776. He was educated at Dr. Barrow's school, Soho, and made his first trial of the business of life as a teacher at a day-school in Castle Street, Leicester Square. From this employment he was dismissed for acting plays with the elder boys, and he obtained a situation as clerk in an office. The monotony of this vocation ill accorded with his nature, and he resolved to try his fortune on the stage. After a career of several years on the provincial boards his comic talents when performing at the Newcastle theatre attracted the attention of Charles Kemble, and through him he was introduced to Mr. Colman of the Haymarket, where in 1806 he made his appearance as Sheepface in the Village Lawyer, and Zekiel Homespun in the Heir-at-Law. These performances were decidedly successful, and his subsequent personations at Covent Garden of Jacob Gawkey in the Chapter of Accidents, and Lord Grizzle in Tom Thumb, confirmed his reputation with the public. He continued at Covent Garden till 1823, when he transferred his services to Drury Lane, and created there a perfect *furore* by his Mawworm in the Hypocrite, and his still more famous Paul Pry in the comedy of that name. With this last character, which he made his own, Liston's name is more especially identified. From 1831 to 1837 he was attached to Madame Vestris' company at the Olympic Theatre, and afterwards he retired from the stage. He died of apoplexy on 22d March, 1846.

LISTON, ROBERT, an eminent surgeon, was the son of the minister of Ecclesmachan, Linlithgowshire, and born there on 28th October, 1794. He studied at Edinburgh College, became one of the house-surgeons at the Royal Infirmary there in 1815, and in 1817 established himself in the town as a practitioner. He delivered lectures on anatomy and surgery, and speedily rose to eminence both as a lecturer and operator. In 1833 he published his Principles of Surgery, which went through several editions. The following year he removed to London as surgeon to the North London Hospital, and subsequently became professor of clinical surgery in University College, an office which he retained till his death. Mr. Liston was noted as an operator for his coolness, promptitude, and rapidity, qualities which raised him to the position of the first surgeon of the day, though his manner and general deportment were complained of as rough and unceremonious. He died of aneurism of the aorta on 7th December, 1847.

LITANY (from the Greek *litaneia*, supplication, prayer), a form of prayer or song, first specially used on occasions of public calamity, and introduced, according to Zonaras and Nicephorus, by Proclus, about the year 446, at Constantinople, in the reign of Theodosius; according to Paulus Diaconus, under Justinian, at Antioch, in consequence of the following circumstance: An earthquake, says the legend, having driven the people into the fields, a boy was suddenly taken up into the air in their presence, but was again let down unhurt, on the people crying out '*Kyrie eleeson!*' (O Lord have mercy). The boy related he had heard the songs of the angels, 'Holy God! Holy

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and Mighty, Holy and Immortal! have mercy upon us!' and this gave rise to the Litany. This kind of common prayer was perhaps not unusual among the Jews, and Psalm cxxxvi. seems to have been adapted to this purpose. Litanies afterwards became very common, and every saint of the Roman calendar has his litany. It must be owned that some of these are very unmeaning, enumerating all the names and miracles attributed to the saint, and in this respect not unlike those prayers of the Romans which consisted merely of a catalogue of the names of the deity addressed, against which St. Paul gives a particular warning. Litanies are found in the old hymn-books of the Lutherans, but are no longer used by German Protestants. The Catholic litanies are distinguished into the greater and less. The latter is said to have been composed by Bishop Mamertus, of Vienne (in France), in 446, when that place was visited by repeated calamities; the former by Gregory the Great, during an inundation of the Tiber and a raging plague. This consisted of a song of seven choirs (hence *septiformis*), of clergy, monks, nuns, boys, girls, Roman citizens, and widows and married women. The litany probably consisted at first of the words *kyrie eleeson* (or the popular but incorrect form *kyrie eleison*), but was gradually enlarged. The litany was annually sung on the *dies rogationum* (days of entreaties). At a later period the litany was not only addressed to the Holy Trinity, but also, as we have said, to the saints, and sung in processions. This latter kind of litany of course was omitted by the Protestants. The usual answer of the people is *Ora pro nobis* (pray for us), if the litany is directed to the Virgin or a saint; or *Libera nos* (deliver us), if it is addressed to the Deity. In the Anglican prayer-book the litany is retained, and though it adheres in many respects to the ancient forms it differs from that of the Roman Church, and contains no invocation of the Virgin or the saints. Since 1661 it is no longer a distinct service, but, when used, forms part of the morning prayer, after the third collect for Grace. Indecent parodies have often been made on litanies, and sung in connection with other profane songs. In early times instances occur of this being done even by monks. The following parody is taken from the Cavalier's Letanie (1647):—

> From too much keaping an evil decorum,
> From the manyfold treasons *parliamentorum*,
> From Oliver Cromwell, *dux omnium malorum*,
> *Libera nos.*

See the Sacræ Litaniæ variæ (Antwerp, 1606) and Bingham's Origines Ecclesiasticæ for a great variety of litanies.—That this simple form of prayer and response has at times been of great advantage to the people cannot be denied; and because many litanies are poor all ought not to be condemned. See LITURGY.

LITCHFIELD. See LICHFIELD.

LITCHI, or LEE-CHEE (*Dimocarpus* or *Nephelium Litchi*), the fruit of a tree with pinnate leaves belonging to the natural order Sapindaceæ, a native of the south of China. The tree is of a moderate size, with brown bark, which is very bright in the twigs; the leaves are large, and not unlike those of the laurel, are alternate, and hang gracefully. The fruit is produced in bunches, which are pendant from the extremities of the twigs; and there is a considerable quantity of fruit in the bunches, not close together like grapes, but on stalks. The litchi is a red or green berry, about 1½ or 2 inches in diameter, with a tough, thin, leathery coat, and a colourless half-transparent pulp, in the centre of which is a single brown seed. The pulp is slightly sweet, and grateful to the taste. The litchi is often brought to this country in a dried state, and though the pulp is much diminished in size it retains a considerable portion of its original flavour. From the beauty and flavour of this fruit, and the perfection to which they have been brought in this country in all cases where they have had a fair trial, it is by no means unlikely that it may become common as a hothouse fruit.

LIT DE JUSTICE was formerly a solemn proceeding in France, in which the king, with the princes of the blood royal, the peers, and the officers of the crown, state, and court, proceeded to the parliament, and there, sitting upon the throne (which in the old French language was called *lit*, because it consisted of an under cushion, a cushion for the back, and two under the elbows), caused those commands and orders which the parliament did not approve to be registered in his presence. The parliament had the right of remonstrating in behalf of the nation against the royal commands and edicts. If the king, however, did not choose to recede from his measures, he first issued a written command (*lettres de jussion*) to the parliament, and if this was not obeyed he held the *lit de justice*. The parliament was then, indeed, obliged to submit, but it afterwards commonly made a protest against the proceeding. Louis XV. held such a lit de justice in 1763, in order to introduce certain imposts, but on account of the firm resistance of the parliaments he was finally obliged to yield. The last lits de justice were held by Louis XVI. in 1787 and 1788.

LITERARY PROPERTY. See COPYRIGHT.

LITHARGE (Greek, *litharguros*, silver stone) is the name given to the fused oxide of lead as got in the cupellation of silver and gold. It is always of a scaly crystalline structure, and the colour varies from a deepish yellow (distinguished as *silver litharge*) to nearly red (distinguished as *gold litharge*), but it is commonly brick-coloured. It is not pure, but may contain silica, the oxides of copper, antimony, iron, and other metals which may have been present. It is soluble to a greater or less extent in nitric, acetic, and hydrochloric acids, and in caustic soda; it is extensively used in the manufacture of glass, of enamels, of artificial gems, of lead plaster and lead soap, of sugar of lead, white and red lead, and other compounds. It is sometimes reduced again to the metallic state by fusing in a reverberatory with small coal. The lead, however, prepared in this way is always contaminated with other metals, and is not so soft and pliable as that got from the purer oxide.

LITHIC ACID. See URIC ACID.

LITHIUM. The name *lithia* was applied by Arfvedson to an alkali discovered by him in 1817 while analyzing petalite. It was derived from the Greek *lithos* (a stone), in allusion to the existence of the alkali in a stony mineral. Lithia has since been detected in spodumene, in lepidolite (which see), in triphyline, in amblygonite, in tourmaline, in meteoric stones, in sea and various mineral waters, in the ash of tobacco, of coffee, of tea, of blood, of milk, &c. A process for procuring it is the following:—One part of petalite or spodumene, in fine powder, is mixed intimately with two parts of fluor-spar, and the mixture is heated with three or four times its weight of sulphuric acid, as long as any acid vapours are disengaged. The silica of the mineral is attacked by hydrofluoric acid, and dissipated in the form of fluosilicic acid gas, while the alumina and lithia unite with sulphuric acid. After dissolving these salts in water, the solution is boiled with pure ammonia to precipitate the alumina; is filtered, evaporated to dryness, and then heated to redness to expel the sulphate of ammonium. The residue is pure sulphate of lithium, which is dissolved in water, and decomposed by acetate of barium; and the acetate of lithium,

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being heated to redness, is converted into the carbonate of lithium, and finally this is decomposed by lime or baryta, which affords pure lithia. Several other methods of extracting lithia have been proposed. Its colour is white; it is not deliquescent, but absorbs carbonic acid from the air; it is soluble in water; it is acrid and caustic, and acts on colours like the other alkalies; heated with platinum it corrodes it rapidly. It combines with the different acids, and forms crystallizable salts with them. The phosphate and carbonate are sparingly soluble; the chloride is deliquescent and soluble in alcohol, and this solution burns with a red flame. All the salts give a red colour when heated on a platinum wire before the blowpipe. The nitrate is also deliquescent.

Lithia is the oxide of a metal called lithium, which was first obtained in quantity by Bunsen, although indications of it had been observed by Brandes. Unlike the other alkalies it cannot be reduced from its carbonate by carbon, but it requires the action of a pretty powerful galvanic-battery. The compound employed is the chloride, which, while in a state of fusion, is acted on by the battery. Small globules collect round the negative pole, and these are removed and cooled under petroleum. It is the lightest of solids, its specific gravity being only 0·589. It has a bright silver-white metallic lustre, melts at 356° Fahr., and can be welded at ordinary temperatures. It is rather harder than potassium, can be drawn into a wire, but has a low degree of tenacity. Exposed to the air it tarnishes, but it combines with oxygen less rapidly than either sodium or potassium. It decomposes water, and when heated in oxygen, chlorine, and other gases, burns with a brilliant light. It dissolves readily in hydrochloric and dilute sulphuric acid, and reacts violently with nitric acid. The combining weight of the metal is 7.

Compounds of lithium are used in pyrotechny on account of the splendid red colour they impart to flame. In medicine the carbonate is employed especially as a solvent for uric acid, to prevent the formation of calculi and to remove it from the system in gout. Effervescing lithia water is sometimes used in place of soda or potash water. Citrate of lithia is also employed. It is a white, soluble, crystalline salt, prepared by dissolving the carbonate of lithium in citric acid. Its therapeutic properties are similar to those of the carbonate.

LITHOGRAPHY, the art of drawing upon and printing from stone, is a comparatively recent invention, the principles on which it is based having been discovered by a young German literary adventurer about the close of last century.

The entire superstructure of lithography rests upon the facility with which calcareous stones absorb grease and imbibe watery solutions; the mutual antipathy of water and grease, and the disposition of greasy substances to adhere to each other. In illustration, suppose a drawing made on a smooth stone with lithographic ink, which is a greasy substance. The drawing is first treated with weak solutions of acid and gum; then subjected to a process of *charging*, in which gummed water is freely used. After this the stone is again wetted, and an inking-roller is passed repeatedly over it. The parts of the stone not occupied by the drawing are protected by the water and gum repelling the printing-ink, and therefore remain clean. But the greasy lines or marks forming the drawing, having rejected the water, attract the greasy ink, which adheres to their surfaces in sufficient quantity to give off an impression to paper when subjected to the action of the printing-press.

It will be seen that this process differs essentially from copperplate, wood, or type printing. In those operations the impressions are taken from incisions below the surface, or from projections above it; whereas in lithography they are obtained from a uniformly level surface, by the operation of the laws of affinity and repulsion; hence the term *chemical printing*.

The story of Alois Senefelder, the inventor, is told by himself in his Complete Course of Lithography, published at Munich in 1817. He was born at Prague in 1771, but was early removed to Munich, where his father, an actor by profession, permanently settled. Young Senefelder received a fair education, and was studying jurisprudence at the University of Ingoldstadt, when his father's untimely death threw him on his own resources. An early predilection for the drama led him to connect himself with the theatres as a means of subsistence; but after two years of wandering and privation he quitted the stage in disgust, resolving to devote himself exclusively to literature. His first essay—a small dramatic composition—proved a failure. His poverty forbidding all hope of launching a second venture in the usual way, he set about devising means to become his own type-founder, printer, and publisher. With this view he partially wrought out a contrivance to imitate type-printing; but that was soon relinquished because of the expensive nature of the materials, and his next scheme was to etch imitations of printed characters on copper-plates. In prosecuting this design, the necessity for a varnish to cover and enable him to re-etch his frequent errors in writing backwards soon presented itself. The stopping-out mixture of the engravers being unknown to him, he proceeded to make one for himself, and in course of his experiments hit upon the mixture of bees'-wax, soap, and lamp-black, by means of which he was destined afterwards to found an entirely new art.

Although the possession of this varnish removed one great obstacle to his practising on copper, the labour of repolishing the used plates eventually disheartened him, and he was on the point of abandoning all further attempts, when his attention was drawn to a slab of Kellheim stone—a species of calcareous slate he used for grinding colours. It struck him that by polishing this slab, and covering it with a thin layer of his composition, he might continue his writing exercises with greater facility than on copper, and, the stones being cheap and plentiful, at a trifling cost. He accordingly proceeded to work on the new material, treating and printing it in the same manner as a copper-plate; but at this juncture a seemingly trifling circumstance gave a new direction to his experiments, resulting in the discovery of lithography.

He had just polished a stone, when his mother desired him to make out a list of clothes she was giving out to wash. Neither paper nor ink were at hand, but the polished stone and his composition, kept by him in a liquid form, presenting convenient substitutes, he therewith jotted down the list, to be copied at leisure. Soon after, when about to wipe the writing from the stone, the thought struck him to try the effect of reversing his usual practice. Hitherto he had scratched and corroded the writing *into* the stone through a thin layer of his varnish; but he now proposed to execute the writing on the clean stone with his varnish, and then depress, with diluted aqua-fortis, all parts of the stone not covered by the writing, which, resisting the acid, would thus leave the lines standing above the surface. This slight relief, he thought, might admit of the printing-ink being applied to the writing in the same manner as to a wood block or types.

The first trial was encouraging; and after varied experiments his gratification was intense when, even with the rude and imperfect means at his command,

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he found he could produce with ease a firm and clear impression from the slightly raised writing.

Although this was not the chemical lithography now practised, and which he afterwards invented, still the comparatively perfect results of the new and facile method of printing, and the inexpensive nature of the process, convinced Senefelder that he had made an important discovery. The prospects of fame and wealth it opened up at once diverted his ambition into a new channel; but his poverty stood in the way of giving his invention the fair trial which he felt assured was only wanting to prove its wide utility.

Various expedients to procure the necessary means utterly failed, and he was becoming hopeless of ever realizing his dreams of success, when he met with Gleissner, a musician, who, being about to publish some compositions, was induced to intrust the work to Senefelder, and to advance the necessary funds on condition of sharing half the profits. These pieces, the first-fruits of stone-printing, published in 1796, with a number of subsequent works, chiefly writing and music, were executed as described above, inked with a flat board covered with cloth, and printed with an old copperplate press. The range of this method was, however, very limited; and it was not until Senefelder invented a press with a new action, and by applying the principles of chemical affinity, avoided the objectionable necessity of depressing the surface of the stone, that lithography attracted the attention it merited, and took its place among the fine arts.

Within a few years the secret of the new art had become widely known, and practised in defiance of the inventor's claim to exclusive privilege. Senefelder experienced the not unusual fortune of inventive genius; for while he continued to plan and work out improvements and new methods, others adopted them and reaped the fruits; for though he had occasional gleams of pecuniary success, he found himself at the end of fifteen years' unremitting toil still poor and in debt. But at this period a fortunate accident introduced him to the president of the board commissioned to survey the Kingdom of Bavaria, by whose intervention he was appointed superintendent of the lithographic department, with a liberal salary, this good fortune being after a few years further increased by a pension from the king.

Senefelder was now in a position to continue his efforts towards perfecting his invention, unmolested by the strifes and cares which had so long pursued him, and he sedulously devoted every spare hour to the all-engrossing pursuit. He died in 1834, and so far as the principles and methods of application are concerned, it may safely be affirmed that he left the art of lithography in nearly as perfect a state as it now is. Even in his work, published seventeen years before his death, he enumerates twenty different 'manners,' including all or nearly all the methods now practised. And though the accumulated experience and mechanical improvements of three quarters of a century have simplified the processes and perfected the appliances, thereby reducing the practice of the art to a degree of certainty it did not possess in the earlier time of Senefelder, it is doubtful whether he left much or anything for his successors to discover in novelty of application.

An attempt to establish lithography in England was made in 1802 by M. André, one of Senefelder's temporary partners, and Senefelder himself visited London to superintend the commencement of the undertaking. But the project failed through the incompetency of M. André's brother, who was left in charge. In 1807 a second attempt was made in London, but failure was again the result. About this time, however, lithography was taken up by the ordnance authorities, though it was not generally adopted until 1816, when it began to attract the attention of competent artists. From this period till about 1830 its progress in Britain was slow, but since then it has rapidly advanced both in the beauty of its artistic productions and in its extensive application to trade purposes.

Lithography seems to have been excluded from France till 1814, but its development there was more rapid than in Britain, and at a very early period the chalk drawings of the French artists surpassed all others. France and Germany have still the pre-eminence in chalk-drawing, but in chromo-lithography they are now rivalled by Britain.

We now proceed to describe the materials and instruments used in lithography, and the methods generally followed in executing works in the different styles.

Lithographic Stones.—The kind of stone which Senefelder first met with and continued to use is superior in quality to any hitherto found elsewhere. It had long been used in Bavaria for interior architectural decorations, an abundant supply being obtained in the district extending from Pappenheim to Kellheim on the banks of the Altmühl, a tributary of the Danube. A similar stone has since been found in France, Prussia, England, and America; but all are inferior to that supplied from Solenhofen, the depot of the Bavarian stone district. It is a species of slaty limestone, found in layers from ½ inch to 8 inches thick. The colour of the best quality is a pale yellowish drab; the inferior descriptions vary in hue from a dirty reddish drab to a cool gray or green tint. The thickness necessary to stand the pressure in printing ranges from 1½ to 4 inches, according to the size of the stone.

Grinding, Polishing, and Graining Stones.—To avoid risk of fracture in printing, the stones must be carefully squared and levelled; but to fit them for the lithographer, a further process of grinding and polishing is necessary. Two stones are placed on a table face to face, finely sifted sand and water being introduced between them. The upper stone is then moved over the lower with a regular circular motion; more sand and water is supplied from time to time, and the motion continued until the surfaces of both stones are brought to an uniform smooth and perfect level. If a stone is to be used for ink-drawing, engraving, or transfers, the surface is further polished with water-of-Ayr stone. A different finish is given to the stone for chalk-drawing or for tinting, the surface being granulated or *grained*. This is done by moving a small stone over the surface of that to be grained, causing it to revolve in small circular sweeps. Very finely-sifted sand is used, and considerable skill and experience is needed to determine when the movement should cease or fresh supplies of sand be stopped, as thereon depends the quality of the grain, which must be rough or smooth according to the size of the drawing or the texture of the objects in it.

After polishing or graining, the stone must be carefully brushed and washed with pure water, and then laid aside to dry. Used stones can be re-ground and made fit to receive successive drawings or transfers, but all trace of the former work must be obliterated.

Should a stone be too thin, or made so by repeated grinding, it is usually *backed* by bedding it on an inferior stone, on slate, or Aberdeen granite.

Lithographic Inks, and Chalks or Crayons.[1]—As

[1] The term *chalk*, or crayon, applied to the lithographic substance so named, is strictly technical, and seems to have been given it merely because its appearance and use are similar to the mineral chalks and crayons made for drawing on paper.

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most lithographers manufacture their inks and chalks according to their own particular formula, the following materials and modes of compounding, though frequently, are by no means invariably adopted.

The ink used in pen or hair-pencil drawing direct on the stone is commonly made of the following materials:—

Virgin wax.	Shellac.
Dry white soap.	Mastic.
Tallow or lard.	Lampblack or Paris black.

For writing or drawing on paper prepared for transferring to stone, the shellac is sometimes omitted and the ingredients differently compounded, but generally the same ink is used for both purposes.

The ink for transferring copper or steel plate engravings, &c., to stone is usually composed of

Brown wax.	Varnish of burned linseed-oil.
Brown soap.	Burgundy pitch or black pitch.
Tallow or stearine.	Lampblack.
Shellac.	

Some lithographers use the above mixture indifferently for plate transfers and for transferring work from one stone to another. Others again make up a separate ink for stone transfers of brown wax, soap, tallow, and shellac, and while warm grind lampblack into it.

The ingredients composing the chalks are nearly the same as those used in making drawing-ink, but the mastic is frequently omitted and a little Brunswick-black added, to give more firmness and tenacity. Castile soap is also often substituted for the common white soap always used in making ink.

The manner of compounding the inks and the chalks is nearly the same, but here again the practice is not invariable. The usual mode, however, is first to melt the wax and tallow in a copper or iron pot over a moderate fire, then adding the other ingredients, keep the vessel on the fire, while continuing to stir until the whole is perfectly dissolved. It is then removed from the fire, ignited by a rod of red-hot iron, and allowed to flame for fifteen or thirty minutes, according to the required consistence. The flame is now extinguished by closing the vessel, and lampblack and Frankfort black are stirred into the mixture. When thoroughly incorporated the mass is poured out on a hot slab, and if to be made into chalk or crayons is cut, when cool, into small pieces fitted for the different uses it is to be put to, or it may be poured into oiled brass moulds, and thus fashioned into the desired shapes.

It is worthy of mention that Senefelder's first and simplest compound of wax, soap, and lampblack makes a good serviceable ink or chalk.

The composition for ink-drawing or writing is made liquid by dissolving it in pure soft or rain water, the presence of the soap causing its solubility.

Transfer Paper.—Writings or pen-drawings made upon prepared paper can be transferred to stone in a very perfect manner, and the process is so convenient that it has to a great extent superseded ink-drawing or writing direct on the stone. Impressions from engraved plates, wood-blocks, types, or stone, can also be perfectly transferred by means of a somewhat differently prepared paper. That for drawing or writing upon is made by coating one side of thin well-sized paper with a mixture of isinglass or gelatine, flake-white, and a little gamboge, melted over a slow fire, carefully strained, and spread over the paper while hot with a broad camel-hair brush. The paper is afterwards passed through the press, with the coated side laid on a steel plate in order to render it perfectly smooth. The mixture for coating the paper used in transferring from plates, &c., is made of fine wheaten flour, plaster of Paris, and a little glue or gelatine; it is likewise strained, but is spread when cold on a thicker softer paper.

Instruments.—The lithographic draughtsman requires all the instruments employed in drawing upon paper, but besides these he not only adopts some tools of the engraver, but manufactures others peculiar to himself. For writing or drawing with ink upon transfer-paper or upon stone, he uses quills scraped very thin, small sable-hair brushes, and a peculiar kind of steel pen made by himself from very thin and finely-tempered ribband-steel. For etching or engraving steel points similar to those of the copperplate engraver are employed, and the glazier's diamond, as securing a permanently keen point, is also used. The flat scraper of the mezzotinto engraver is a useful instrument to the lithographer in all styles, and common needles fixed in handles are used to pick out inequalities or give fine gradations in chalk-shading.

In proceeding to describe the different methods of lithography it is perhaps hardly necessary to premise that in the practice of this, as in all other arts, there are peculiarities in manipulation and treatment which vary according to the taste or training of the artist or the necessities of his subject.

Ink Drawing direct on the Stone is executed with the steel pens and sable-hair brushes, the dissolved ink being made of such a consistence as will permit it to flow readily in working, but not so thin as to spread on the stone. A polished stone is used, upon which the outline is traced by means of red-chalked paper, as described in article ENGRAVING, under the head *Painter's Etching*. The artist then proceeds to work as if drawing upon paper; but the stone must be carefully protected from the slightest contact of its surface with anything of a greasy nature.

The work is executed chiefly in lines, but broad touches may be laid in to strengthen the effect, and light details can be taken out with the scraper, which is also used to reduce the strength of any part made too dark, or to erase errors, which may again be worked over, as the grease in the ink does not immediately sink under the surface of the stone, or until heat be applied.

Preparing the Stones.—When a drawing is completed the very important operation of preparing the stone for printing remains. As this preparation precedes the drawing in some styles, and is necessary at the completion of all, a brief description now will save repetition.

The object of the preparation is to give to all parts of the surface of the stone exposed to its influence the property of repelling greasy substances. After numerous experiments Senefelder discovered that this property could be most efficiently imparted by treating the stone with diluted nitric acid and a solution of gum-arabic. His view of the rationale of the process was, that the action of the acid upon the stone is chiefly of use in making it receive the gum more effectually, and that the gum, in conjunction with water, is the principal agent in repelling greasy substances. The truth of this opinion is confirmed by the fact of stones containing transfers being now frequently prepared with gum alone. No greasy matter will adhere to the parts of the stone impregnated with gum; neither will the acid or the gum take effect upon a part solidly covered with a greasy substance, except the acid remain long upon it, or a strong mixture be applied. The acid, however, renders the ink or chalk insoluble with water, by combining with and neutralizing the alkali in the soap.

In preparing a stone it is sometimes first subjected to the action of the acid alone, by laying it in a trough slightly inclined, and pouring repeatedly over it a weak mixture of about 1 part of nitric acid to

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100 parts water. This is called *etching* the stone, which is next washed with pure water, and then covered with the solution of gum. The acid and gum are, however, frequently mixed and applied together with a broad, flat camel-hair brush, and allowed to remain until dry. When thus applied there is less danger of the acid injuring the work by eating away the ink or chalk of the drawing, the greasy portion of which has not yet penetrated below the surface of the stone. Before printing the drawing undergoes further treatment, but this will be noticed in the proper place.

Chalk Drawing.—The best quality of stone is required for this style. It must be equal in colour and consistency, and grained to suit the size and nature of the drawing. The outline is traced on as before, by means of the red-chalked paper.

Although the manner of execution is much the same as chalk-drawing on paper, and a rough sketch can be drawn with nearly as much facility, still the necessity of impressing every touch on the stone in such a manner as will make it *tell* in the subsequent printing, causes the operations to be more tedious. This is especially the case in the deep rich textures and delicate tones of a highly-finished drawing, on which the manipulation calculated to insure a satisfactory result in printing is not only a very tedious process, but demands great skill and experience in the artist. Repeated and careful working over the parts must be followed by a laborious picking with needles to equalize the tones and perfect the gradations. Thin light lines and sharp white touches are taken out with the scraper; intense black lines or touches may, if required, be put in with the hair pencil and ink.

The preparation of a chalk drawing for printing requires more care and judgment than any other style. The particles of chalk in the delicate shades having such a slight hold on the granulations, they are liable to be partially or wholly removed by the acid.

Engraving on Stone.—This manner, which resembles line engraving on metal, is well adapted to precise and minute work, such as machinery, ornament, small figure subjects, &c. A hard polished stone is selected, and first prepared with the acid and gum. It is then washed with water, a portion of the gum being left on the surface. When dry powdered red chalk is rubbed over it with the palm of the hand, or it gets instead a thin coating of gum mixed with black. The black ground shows the work with greater distinctness during progress, but the red permits greater freedom in working, the outline being traced on with red or black, as the opposite colour of the ground requires. The drawing is produced wholly by lines scratched through the ground and preparation with steel points, the ruling machine (see ENGRAVING) being also made available in representations of machinery. The lines should fully penetrate the stone, so as to expose it to the linseed oil which is spread over the drawing when completed—the ground protecting all parts excepting the lines, which at once absorb the oil. The ground is now washed carefully off with water, the oil on the surface being carried with it, and left only in the lines, which are next *charged* by printing ink being rubbed gently all over it, the gum previously absorbed still preventing the greasy ink from adhering to any part but the oiled lines. The inking roller is now passed over the stone, and takes up all the superfluous ink from the surface, which is again slightly gummed previous to printing.

Etching on Stone is much in favour with German artists, but is rarely practised in Britain.

When prepared the stone is heated and covered with etching ground similar to that for copper, but containing more wax. It is next smoked, and when the stone cools the outline is traced on or transferred by passing it through the press. The work is executed as described above in Engraving, but as the incisions need not penetrate beyond the etching ground, on account of their being afterwards cleaned out with acid, the movement of the point is much freer, and hence this method is better adapted for picturesque subjects than engraving. The biting-in is effected with diluted acetic or with muriatic acid, stopping-out being done with drawing ink. When bit the stone is washed and dried, and the lines filled with printing ink. The ground and surface ink are cleaned off with a mixture of turpentine and water, and a slight gumming fits the stone for immediate printing.

Writing and Drawing on Transfer Paper.—All kinds of writing, plans, outline, and half-shaded drawings can be executed with facility and precision on this medium. The manner is precisely that of pen-and-ink drawing on ordinary paper.

When the work is completed the paper is damped, placed on a warmed polished stone, and passed several times through the press. The back of the paper is again damped, and the stone again passed repeatedly through the press, its position being changed to insure equal pressure on all parts. The paper is now soaked with water, and taken off piecemeal, revealing the writing or drawing perfectly transferred to the stone. It may be prepared for printing by merely gumming the surface and strengthening the lines, either by inking with the roller or by passing a woollen rag charged with printing ink rapidly to and fro over them. It is desirable, however, to etch the stone so as to cleanse it from all impurities. Any writing upon common paper, executed with lithographic ink, can also be transferred, if sponged on the back with diluted nitric acid.

Transferring Engravings, &c., to Stone.—This branch of lithography has of late years made great advances, and excepting fine and highly-finished pictorial work, almost any engravings in line or stipple can now be transferred and printed in a very perfect manner. Transfers from woodcuts or types, and from one stone to another, are also effected with equal success. The process is very simple. A careful impression is taken upon the prepared paper with the ink previously described, the impression from a plate being generally passed through the press between blotting-paper, to divest it of the superfluous ink from the deep incisions. The paper is then damped as before, placed on the stone, and transferred in the same manner as the writings or drawings described above.

Tinting and Chromo-lithography.[1]—The operations in all kinds of tinting and chromo-lithography being nearly alike, a sufficiently clear understanding of the whole may be conveyed to the general reader by describing one of the processes. We shall therefore confine ourselves to that adopted in imitating a chalk drawing on tinted paper touched with white.

The subject is drawn upon a grained stone—the dark shadows and the positive shading required to make out form only being put in. It is then prepared for printing, and an impression taken, which is immediately reversed upon a separate stone, also grained. This latter forms the tint stone, which

[1] Tinting, in lithography, includes not only the warm or cool neutral tones printed over the whole or part of a drawing, but all colour printing in flat or uniform single colours. The term chromo-lithography is applied to the combinations and blendings of colours in imitating oil-paintings and water-colour drawings; copies of which, approaching fac-simile in exactness, can be produced by a series of printings from separate stones.

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is ordinarily thus treated:—The outlines are first scratched firmly into the stone with a point, after which the margins and the parts intended to tell as white touches in the printing are painted over with an acidulated solution of gum coloured with vermilion. The stone is then warmed, and when the gum hardens a piece of soft ink is rubbed all over the surface and spread evenly with a woollen rag. The only trace now left of the impression is the incised outline, which guides the artist in laying in darker gradations more solidly with liquid ink, if necessary, or in taking out softer lights with the scraper. Etching and gumming now follow, after which the gum protecting the margins and touched parts is washed off, and the process is completed. When this stone is printed over an impression of the drawing, the parts grounded with the soft ink, having only taken on the coloured ink from the inking roller, form the tint, the white touches being produced by the non-printing of the gummed and scraped-out parts.

A simpler and more elegant method than the above is now, however, practised by many lithographers, obviating the necessity for incising the outline, which sometimes caused blemishes in printing. The improvement lies in the manner of grounding the tint stone after reversing the drawing and gumming the margins and white touches. Instead of rubbing on the soft ink a roller charged with a varnish of burned linseed oil, slightly coloured, is passed over the stone, imparting a thin transparent coating. When this hardens it can be scraped and otherwise treated with greater freedom and certainty than the rubbed-in ground, as the reversed drawing is clearly seen through the transparent varnish.

In a pure chromo-lithograph the first or subject stone consists only of the outlines of the picture. From this impressions are taken, and reversed upon as many separate stones as there are colours to be printed; so many as thirty different stones having been required in some of the finer specimens lately published. On each of these stones all objects in the picture having the same colour are separately worked in with chalk, ink, stumping, &c., the gradations of *tone* in the colours being produced by darker or lighter shading. Each stone is carefully prepared for printing in the usual manner.[1]

Lithographic Printing.—The peculiarity of this process consists in the mode of applying the pressure, In type and copperplate printing it is applied vertically by a flat surface or by a cylinder; whereas a lithographic impression is obtained by friction.

As the printing ink will not adhere readily to the ink or chalk remaining on the surface of the stone, it is desirable to remove it by dissolving it with turpentine mixed with a little sweet oil, and washing it off with water. The result is an apparent obliteration of the work. But the colourless grease remaining in the pores of the stone attracts the printing ink, which is now applied by passing the roller over the surface in all directions, causing the writing or drawing gradually to re-appear. This operation demonstrates that the grease alone is essential to the results in printing, and that all the other ingredients in the inks and chalks are merely vehicles for applying the grease to the stone in such manner and quantity as determines the character and effect of the work.

The printing is now proceeded with. The stone, previously placed on the table of the press, is again wetted, and again inked; the paper is laid on the tympan, brought down over it, and the further end run under the scraper. The lever is now brought down, raising up the table with the stone; the handle attached to the roller below is turned, by means of which the table and stone is moved slowly along to the end under the pressure of the scraper. The pressure is now relaxed by raising the lever, the table is drawn back, the tympan raised, and the paper, with the impression now on it, lifted carefully off. The operations of wetting the stone and inking are repeated for each impression. The printing paper must not have any acid or alum in its composition, because the presence of either destroys the work after a very few impressions have been taken.

About the year 1850 steam power began to supersede manual labour in driving the lithographic press, and not long after, a cylinder machine, driven by steam power, was introduced, by which the entire operation of printing was to be performed, the pressure of the cylinder being employed to produce the impressions instead of the scraper of the hand press. For a considerable time the printing of the machine was so imperfect that only the very lowest quality of work could be entrusted to it. In course of a few years, however, improvements in construction, and additional appliances in inking, registering, &c., so perfected the machine, that transfers from plates, line drawings, and chromo-prints of medium size, can now be printed by it in excellent style. 500 revolutions in the hour is the highest speed at which the machine can produce good work, the number of impressions printed by each revolution being from one to twelve or upwards, according as the size of the print allows the greater or lesser number of transfers to be put on the one stone. The machine is not yet capable of printing fine chalk drawings, especially of large size, or the highest class of chromo-lithographs. These must still be printed at the hand-press by scraper pressure.

The number of good impressions that can be taken from one drawing or transfer, ranges from 500 to 5000 and upwards according to style; chalk drawings producing fewest, and ink drawings the greatest number. A drawing or writing can be kept good on the stone for any length of time, by first washing it with turpentine and water, then rolling it in with *preserving* ink—a mixture of tallow, wax, and printing ink—and finally covering it with gum mixed with sugar-candy; but this process must be renewed at intervals of at most six or twelve months.

Zinc can be drawn upon, treated and printed in much the same manner as stone; and, as it is more portable, the plates used for the purpose being less than one-eighth of an inch thick, attempts have been made to introduce it as a substitute, but practical difficulties have prevented its being generally adopted. Attempts have also been made to fix photographs from natural objects on stone, and to treat and print them like drawings, but as yet results have only been obtained by a few persevering experimenters which may be considered as quite successful. Photographs from line drawings and from the more ordinary class of line engravings on wood or steel, are now, however, successfully transferred to stone, and printed in the usual manner.

LITHOTOMY, in surgery, the technical name for the operation popularly called cutting for the stone. As usually performed it consists in cutting by the side of the anus in the perineum, so as to

[1] To make the colours on the different stones fall on the proper places in the separate printings holes are drilled into the opposite margins in exactly corresponding positions on all the stones, and into these holes small needles are inserted. In laying on the paper to take the impression first from the subject stone, the margins of the paper are pierced by the needles, which are then taken out, and the printing effected. When the impression is again laid on for the separate printing the perforations in the margins made by the needles in the first stone are guided over the points of the needles in the separate stones, and a perfect *register* thus secured.

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reach and divide the urethra and neck of the bladder, where it is surrounded by the prostate gland. A grooved and curved staff is introduced into the bladder first, and then the incision is made in the perineum to reach the bladder, the groove in the staff serving as a guide to the knife. When the calculus or stone is felt with the finger the staff is withdrawn and the stone extracted by means of forceps, proper treatment to ward off inflammation and other accidents being then adopted. When thus performed, unless there be unusual difficulties, the length of time required to extract the stone is seldom more than three minutes, often one or one and a half. At first the urine escapes through the wound, but in favourable cases it issues by the natural passage in a week, and the wound heals in the course of a month.

LITHOTRITY, in surgery, the operation of crushing a stone in the bladder into fragments of such a size that they may be expelled by the urethra. The instrument by which the stone is broken up is introduced in the same manner as a catheter or sound into the bladder, and after catching the stone either crushes, bores, or hammers it to pieces. Crushing is now most frequently resorted to. The instrument has two movable blades at the extremity, which are brought together to crush the stone by means of a powerful screw. This operation is only applicable where the bladder is not irritable, where the canal of the urethra is of good size, and the stone small. It is inapplicable to children, but this is little to be regretted, as there is perhaps no surgical operation more generally successful than that of lithotomy in children. Care must be taken that no portions of the stone are left in the bladder, as such fragments are almost certain to form the nuclei of fresh concretions.

LITHUANIA (in the language of the country, *Litwa;* in German, *Lithauen*); an extensive country, formerly an independent grand duchy, containing 60,000 square miles, but in 1569 united to Poland. Since the dismemberment of that kingdom in 1773, 1793, and 1795, the greater portion of it has been united to Russia, and forms the governments of Mohilev, Vitepsk, Minsk, Vilna, and Grodno. The climate is temperate and healthy, and the face of the country nearly a level, interrupted only by a few insignificant hills. The soil is in some parts sandy; in others marshy, or covered with woods; but, wherever it is cultivated, very productive. The principal rivers are the Dvina or Dwina, the Dnieper, the Niemen, the Przypiec, and Bug. There are also many lakes and morasses. Lithuania raises considerable numbers of cattle, and produces abundance of corn, flax, hemp, wood, honey, and wax. It also yields iron. The forests are full of game; among the wild animals are the urus, lynx, elk, beaver, &c. Corn, wax, honey, wolf and bear skins, leather, wool, and small but good horses, are exported. The manufactures are iron, glass, leather, and there are numerous distilleries. The Lithuanians, who are of Lettish origin (see LIVONIA), were in the eleventh century tributary to Russia, but they made themselves independent when Russia was divided by the troubles under the successors of Vladimir. Ringold, in 1235, bore the title of grand duke, and under his successors the whole of Russian Lithuania was separated from Russia. Vladislaus Jagello, by his marriage with the Polish queen Hedwig, united Lithuania and the conquered Russian provinces with Poland. A portion of Lithuania, 6675 square miles, now forms part of Gumbinnen, in the province of East Prussia.

LITMUS, or LACMUS, is a blue pigment obtained from *Lecanora tartarea*, or from any of the other lichens which yield archil. The plant, bruised between stones, is exposed to the air for several weeks, and moistened with ammonia or stale urine, lime and potashes being also added. Fermentation sets in, the lichen becomes red and finally blue, and when it has acquired the proper tint chalk or sulphate of lime is added, and the soft paste is made into square cakes by pressure in moulds, and the cakes are then dried. They are friable, have an indigo-blue colour, (and are sometimes adulterated with indigo), and a pleasant odour. When treated with water the blue colour dissolves, and a quantity of mineral matter remains insoluble. When incinerated, litmus leaves a bulky ash, which dissolves in hydrochloric acid with effervescence. The blue solution is reddened by free acids, and by several salts of the heavy metals with strong acids. The blue colour is restored by addition of an alkali or alkaline carbonate. The colour is destroyed by chlorine and by bleaching solutions. Litmus is used almost entirely as a test for acids and for alkalies. For this purpose either the carefully prepared aqueous solution itself is employed, or else unglazed paper steeped in the solution and dried. To test for acids the blue colour is employed, care being taken that there is no free alkali or alkaline carbonate present in the litmus which would render it less sensitive; and for alkalies, the infusion tinged red by the careful addition of dilute sulphuric acid. According to some chemists litmus contains several colouring matters of definite composition, which can be separated by the successive use of water, acid, and alcohol.

LITRE, a French measure of volume, also called a *cubic decimetre;* it is equal to 1000 cubic centimetres. The cubic centimetre is a unit of volume much used by physicists, it is equal to 0·0000353166 cubic feet; the mass of a cubic centimetre of distilled water at 4° C. is called a *gramme*, it is equal to 15·432349 English grains. The litre is equal to 1·76172 imperial pint. See also DECIMAL SYSTEM.

LITTLEHAMPTON, a maritime town of England, in the county of Sussex, 18 miles west of Brighton. It has straight and well-kept streets, well-built houses, a parish church, in the early English style, and several other places of worship. The harbour, formed by the influx of the Arun into the English Channel, is defended by a fort, and is accessible to vessels of considerable burden. Littlehampton is the port for Arundel, and has a custom-house. It has, of late years, become a fashionable and much-frequented sea-bathing resort, with a bathing-ground unsurpassed for comfort and safety. A drainage scheme and water supply have recently been completed at a cost of between £20,000 and £30,000. Pop. 3900.

LITTLE ROCK, a city of the United States, capital of Arkansas; 1065 miles west by south of Washington, on the right bank of the Arkansas, here navigable, 250 miles from its mouth. It stands on a rocky bluff, rising about 50 feet above the river, and is the last place where rocks occur going down the stream. It is regularly laid out; has Presbyterian, Episcopalian, Baptist, Methodist, and Roman Catholic churches; a state-house, court-house, and jail, banks, a theatre, military college and other schools, a States' arsenal, a States' land-office, a penitentiary, saw and flour mills, carriage-works, foundries, and printing-offices. First settled in 1820. Pop. in 1880, 13,138.

LITTLETON, or LYTTLETON, THOMAS, a celebrated English judge and law authority, born at the beginning of the fifteenth century, at Frankley. In 1455 he went the northern circuit as judge of assize, and was in 1466 appointed by Edward IV. one of the judges of the common pleas. In 1475 he was created a Knight of the Bath, and continued to

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enjoy the esteem of his sovereign and the nation until his death, at an advanced age, in 1481. His work on Tenures has passed through a great number of editions, those from 1539 to 1639, alone amounting to twenty-four. This work was for long esteemed the principal authority for the law of real property in England, but owing to the many changes in the laws relative to this subject, it is now little consulted by lawyers.

LITTROW, JOSEPH JOHANN VON, an eminent astronomer, born in 1781 at Bischof-Teinitz. After leaving the school there, he studied first at the gymnasium of Prague, and afterwards at its university. After turning his attention successively to law, medicine, and theology, without being able to decide upon a profession, he at last, about 1803, resolved to devote himself to mathematics and astronomy, and though in these sciences he was almost self-taught, he made such progress that in 1807 he obtained the chair of astronomy in the University of Cracow. Scared away by the breaking out of the war, he in 1810 accepted a similar chair in Kasan, where he founded the observatory. The climate, and other circumstances, induced him in 1816 to accept an invitation to be joint-director of the observatory of Buda, and from this he removed in 1819, to become director of the observatory of Vienna. He completely reorganized this establishment, and though disappointed in the expectation of obtaining a new erection, exerted himself to make the old one as complete as possible. His lectures yearly attracted a numerous audience, not only of ordinary students, but of unprofessional persons, many of them strangers from abroad. In Vienna his sphere of activity was large, and the Imperial Academy of Sciences there, though not actually erected till after his death, in 1840, may justly regard him as its founder. His writings, chiefly on mathematical and astronomical subjects, are numerous, and have generally had a very extensive circulation. By far the most popular of all is his Die Wunder des Himmels, of which the fifth edition was published at Stuttgart in 1865. It ranks as one of the best works of astronomy for the use of general readers.

LITURGY (Greek, *leitourgia*, from *leitos*, public, and *ergon*, work or service), a precomposed form of public worship; the term is also specially applied to the service of the eucharist. It is merely our intention here to mention some of the most important liturgies, without entering at all into the question of the primitive forms of worship in the Christian church. Of the six principal oriental liturgies four (those of Jerusalem, Antioch, Alexandria, and Constantinople) are derived from the churches in which they were used; the fifth from the Armenian church, and the sixth from the Syrian sect, the Nestorians. The liturgy of Jerusalem, although ascribed to St. James, is of uncertain origin and date. No Greek manuscript of it is known farther back than the tenth century; but an almost identical liturgy in Syriac, also bearing the name of St. James, is used by the Monophysites, and as it is certain they would not have adopted it from the orthodox at any time, since their communication with them was broken off at the Council of Chalcedon (451 A.D.), the identity of the Syriac and Greek versions mark a date not later than the fifth century. The liturgy of Antioch exists in Syriac, but is evidently only a free translation of that of Jerusalem. Upon this liturgy is founded that of St. Basil, and upon the latter that of St. Chrysostom, which has long been the recognized liturgy of the oriental and Russian churches. The Alexandrian liturgy is ascribed to St. Mark; it is found in a Greek manuscript of the tenth century, and is extant also in Coptic; it is now used by the Christian church of Egypt. The Armenian liturgy dates from the introduction of Christianity into Armenia under Gregory the Illuminator, about 300 A.D.; it is mainly founded upon that of St. Chrysostom. The Nestorians have three liturgies, which, however, are all combined, each being assigned to a particular season. There are various liturgical books in use in the Roman Catholic church, the greater part of which are common to all the members in communion with the church, while others are only permitted to be used in particular places, or by particular monasteries. The Breviary contains the matins, lauds, &c., with the variations made therein according to the several days, canonical hours, and the like. There are various breviaries appropriated only to certain places, as the Ambrosian breviary used in Milan, the Gallican by the church of France, and those of different monastic orders; but the Roman breviary is general. It consists of the services of matins and lauds, prime, third, sixth, nones, vespers, and compline, that is, of the seven hours, on account of the saying of David, 'Seven times a day do I praise thee.' It is recited in Latin. The Missal, or volume employed in celebrating mass, contains the calendar, the general rubics or rites of the mass, and besides such parts as are invariably the same, the *de tempore*, that is, the variable parts on Sundays and holidays that have proper masses; the *proprium sanctorum*, or the variable parts in the masses, for the festivals of such saints as have proper masses; and *commune sanctorum*, or the variable parts on the feasts of those saints that have no proper mass. The canon of the mass was committed to writing about the middle of the fifth century. Gregory the Great made many additions to it. The Ceremonial contains the offices peculiar to the pope, treating of his election, consecration, benediction and coronation, the canonization of saints, the creation of cardinals, the vestments of the pope and cardinals when celebrating the divine offices, &c. The Pontificale describes the functions of the bishops of the Roman church, such as the conferring ecclesiastical orders, consecrating of churches, manner of excommunicating, absolving, &c. The Ritual treats of those functions which are to be performed by simple priests, or the inferior clergy, both in the public service of the church, and in the exercise of private pastoral duties. The ancient Gallican liturgy is that which was in use among the Gauls before the time of Pepin and Charlemagne, who introduced the Roman mode of celebrating divine worship. The Spanish liturgy, more commonly called the *Mozarabic liturgy*, is derived from that of Rome. The Ambrosian liturgy, used in the cathedral at Milan, derives its name from St. Ambrose, who made some changes in it. It does not differ from the Roman in doctrines, though it does in form. The whole of the Roman liturgy is in Latin. The Protestants all adopted their vernacular tongue in the celebration of divine service. In 1523 Luther drew up a liturgy, or form of prayer and administration of the sacraments, which in many points differed but little from the mass of the Church of Rome. He did not, however, confine his followers to this form, and hence every country in which Lutheranism prevails has its own liturgy, agreeing with the others in the essentials, but differing in many things of an indifferent nature. The prayers are read or chanted by the minister at the altar, and the subject of the discourse is in most cases limited to the epistle or gospel of the day. A new liturgy for the principal divine service on Sundays, holidays, and the celebration of the holy communion, was published at Berlin in 1822. This was designed primarily for the use of the royal and cathedral church in Berlin, but has been generally adopted in Prussia.

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Calvin prepared no liturgy; but his followers in Geneva, Holland, France, and other places drew up forms of prayer, of which the Genevese and the French are the most important. The Genevese liturgy contains the prayer with which divine service begins, a confession of sins, public prayers for every day in the week, and for some particular occasions, the Lord's prayer, decalogue, and creed, &c. A new liturgy of the French Reformed Church was compiled in 1826. In England before the Reformation the public service of the church was performed in Latin, and different liturgies were used in different parts of the kingdom. The most celebrated of these were the Breviary and Missal, *secundum usum Sarum*, compiled by the Bishop of Salisbury about 1080. They consisted of prayers and offices, some of very ancient origin, and others the produce of later times. The English Book of Common Prayer dates from the reign of Edward VI. In 1547 Edward VI. commissioned Cranmer, Ridley, and eleven other divines to draw up a liturgy in English. This was published in 1549, and again with some changes in 1552, whence it was called the Second Prayer Book of Edward VI. Some slight alterations were made upon it when it was adopted in the reign of Elizabeth. In the reign of James I., and finally soon after the Restoration, it underwent new revisions. In the portions of Scripture contained in the Prayer Book the authorized version was then adopted, except in the Psalms, which are according to Coverdale's Bible. This was the last revisal in which any alteration was made by authority. The four services for the anniversary of the Gunpowder Plot, the martyrdom of King Charles, the Restoration, and the king's accession, did not belong properly to the Prayer Book, being appended to it by each successive sovereign by order in council. The first three have been discontinued by the queen by order in council. The liturgy of the Episcopal Church in Scotland is the same as that of the Church of England, except that there is a different communion office, which however is used only in some of the Scotch churches. The Kirk of Scotland, or the Scotch Presbyterian Church, has no liturgy. The Directory for the Public Worship of God contains directions for the assembling of the congregation, the manner of proceeding, &c. In 1562 the Book of Common Order, or Knox's Liturgy, was recommended to be used by those who were unable to pray without a set form. The attempt of Charles I. (1637) to introduce into Scotland a book of common prayer, copied from the English, produced the Solemn League and Covenant. The Book of Common Prayer of the Protestant Episcopal Church in the United States of America was adopted in 1789, and, besides some minor deviations from the English, it omits the Athanasian Creed, and in the Apostles' Creed leaves the officiating minister the discretionary power of substituting for the expression 'he descended into hell,' 'he went into the place of departed spirits.' It has adopted the oblation and invocation in the communion service, in which it approximates to the Scottish communion office, and has added six forms of prayer—for the visitation of prisoners, for thanksgiving for the fruits of the earth and other blessings, for morning and evening prayer in families, for the consecration of a church or chapel, and lastly, a beautiful and impressive office of institution of ministers. Among authorities on the subject of liturgies we may mention Bingham's Origines Ecclesiasticæ, Comber's Scholastical History of Liturgies, Neale's Translations of the Primitive Liturgies, Palmer's Antiquities of the English Liturgy, Procter's History and Rationale of the Prayer Book, Blunt's Annotated Book of Common Prayer, Assemanni Codex Liturgicus Ecclesiæ universæ.

LIUTPRAND, or LUITPRAND, a celebrated historian, prelate, and diplomatist, was born at Pavia about 920. From being page of King Hugo he rose to be chancellor under his successor Berengarius, who sent him on an embassy to Constantinople in 948. He fell into disgrace some time after his return, and went to Germany, where he was nominated by the Emperor Otto Bishop of Cremona. In 963 he went as the ambassador of that sovereign to Rome, and was one of the council appointed to investigate the conduct of Pope John II. In 968 he was again in Constantinople, his mission being to ask the hand of the Princess Theophania for Otto's son. He died at Cremona about 972. Liutprand was an excellent scholar, and had closely studied the men and affairs of the Lower Empire. Besides an interesting narrative of his last mission to Constantinople, he has left us a Historia Ottonis, which relates the most important events that took place in Italy and Germany from 862 to 964; and his Antapodasis, a history of Europe in six books, from 888 to 948. These works were published at Antwerp in 1640; they form the third volume of Pertz's Monumenta Germaniæ Historica (Hanover, 1839). They are written in a style remarkable for its purity, and are our chief authority for the period they treat of.

LIVADIA, the name given under the Turkish rule to the ancient Hellas, or Middle Greece, situated to the south of Yanina or Thessaly, and north of the Morea.

LIVADIA, or LEBADEA, a town, Greece, on the Hercyna, a fine mountain stream, 52 miles north-west of Athens. It occupies a considerable space, and before the revolution is said to have been the most flourishing town of Northern Greece, and to have contained 1500 houses; but it has a dull appearance, is poorly built, and consists of narrow, ill-paved streets. It is defended by a castle; and has manufactures of cotton goods, and a trade in small articles of raw produce. Higher up the river, in a narrow gorge, is the site of the ancient Hieron, or cave of Trophonius, and the fountains of Lethe and Mnemosyne. Pop. 5000.

LIVE OAK. See OAK.

LIVER, the glandular structure, which, in animal forms, secretes the bile. In man the liver forms the largest gland of the body, weighing from 50 to 60 oz. This gland is not confined to the Vertebrate animals, all of which—save the Amphioxus or lancelet—possess a well-developed liver, but is found in many Invertebrata; and, indeed, forms the first gland in connection with the digestive system which appears developed, as we trace the structure of the alimentary apparatus from the lower to the higher forms of life. Thus whilst the elementary structures of a liver may be doubtfully present in some of the lowest forms, the higher Annulosa (for example, Crustaceans, insects, &c.), constitute the first group in which true and undoubted hepatic structures exist. In the lower Mollusca the Polyzoa and Tunicata doubtfully, and the Brachiopoda certainly, possess a liver; whilst a liver-mass is well represented in all the higher molluscan forms, among which the ordinary mussels, cockles, snails, whelks, pteropods, and cuttle-fishes may be enumerated. In Invertebrata the structure of the liver is essentially tubular, the ultimate hepatic ducts being traceable into simple cœcal or blind tubes, which are provided with a layer of epithelial cells. No gall-bladder, or receptacle for the secreted bile in which it may be stored until required in the digestive processes, exists in connection with the liver of invertebrates; the efferent duct or ducts of the liver in the latter forms pouring their contents directly into the alimentary tract.

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The liver of man occupies a position in the right upper side and towards the front of the abdominal cavity. In anatomical language it occupies that region of the abdomen to which the name of right hypochondrium has been applied, and extends across the epigastric region into the left hypochondrium. It lies in front of the aorta, vena cava, and spine. The spleen lies to its left. The front or anterior border of the gland is thin and sharp, whilst its posterior margin is broad. It is connected to the midriff or diaphragm by certain ligaments which are derived from the peritoneum or lining membrane of the abdomen, and which are attached to its posterior border. Its upper surface is convex or arched, and fits into the concave surface of the diaphragm—the great band of muscle which forms the floor of the chest, and which divides the chest from the abdomen. Its lower surface is somewhat flattened and irregular, and divided into certain 'lobes' or divisions to be presently noted and described. It overlies a portion of the stomach and duodenum or first portion of the small intestine; a part of the right kidney and its supra-renal capsule; and a portion of the transverse colon. From the prominent position of the liver it can be felt in spare or even in moderately stout subjects, projecting below the cartilages of the right ribs, whilst by means of percussion the physician can with accuracy map out its further dimensions and size. From its position also it is extremely liable to compression and injury in tight-lacing. The ligaments which attach the liver by its upper surface to the midriff may be briefly noticed in the present instance. From the diaphragm two broad layers of the peritoneum are sent to be attached to the posterior border of the liver, and so to form the *lateral ligaments* of the gland. The *suspensory* or *falciform ligament* is attached to the liver nearly in the middle line, and joins the lateral ligaments posteriorly. The *round* ligament, or remains of the *umbilical vein*—an embryonic structure which becomes obliterated a few days after birth—is attached in front to the free edge or border of the liver. The union of the lateral ligaments with the suspensory ligament is sometimes described as an independent structure, under the name of the *coronary ligament* of the liver. The general form of the liver having been already noticed, we may proceed to examine its more intimate structure and relations. The liver is completely invested by the peritoneum, except a small portion posteriorly, where it is united to the diaphragm. The depression in which the gall-bladder rests is also uncovered by the lining membrane of the abdomen. The upper surface of the liver exhibits a division, by the position of the falciform ligament, into two unequal halves. These halves are the *right and left lobes* of the liver, the right lobe being much the larger of the two. This division indicates the fact that in the Vetebrata the liver is a bilateral organ; and in early life it exhibits a perfect two-sided symmetry, extending to either side of the body. As development advances, however, the left lobe decreases in size, leaving the right lobe to form by far the larger half of the organ. The under surface of the liver shows a more complicated and further sub-division of its parts. Five lobes, separated by four fissures or clefts, may be observed on the lower surface of the organ. The *longitudinal fissure* corresponds with the attachment of the falciform ligament above; and forms a deep groove dividing the liver into right and left lobes on its under surface, just as the falciform ligament divided it on the upper surface. The front portion of the longitudinal fissure lodges the round ligament or remains of the umbilical vein of early life; whilst the posterior part of the fissure contains the remains of the *ductus venosus*—a branch of the umbilical vein, and which also becomes obliterated soon after birth. Hence the longitudinal fissure anteriorly is sometimes known as the umbilical fissure; and posteriorly, as the *fissure* of the *ductus venosus*. The *fissure* for the gall-bladder forms a second cleft in the under surface of the organ. The third fissure is that *of the inferior vena cava*, which transmits that vein; this fissure lying in the same line as the fissure for the gall-bladder. And the fourth is known as the *transverse or portal fissure*, which in a manner unites the other fissures, and runs at right angles into the longitudinal fissure. The transverse fissure transmits three vessels, all of importance in the structure and functions of the liver. These are the *hepatic artery*, the *portal vein*, and the *hepatic duct*. The two former vessels enter the organ and supply it with blood; the latter duct leaves the liver by this fissure, and carries the biliary secretion from the gland. The arrangement of the fissures above described has been compared to the letter H. The longitudinal fissure and its posterior part (the fissure of the ductus venosus) being represented by the left bar of the letter; the fissures of the gall-bladder and vena cava correspond to the right bar; whilst the transverse fissure is represented by the cross-bar of the letter. Turning to consider the *lobes* of the gland, we find the larger *right*, and smaller *left lobe* already differentiated. The right lobe bears on its under surface two hollows or depressions; the front depression being for the colon, whilst the hollow behind receives the right kidney. The under surface of the left lobe is undivided into smaller portions, and the three remaining lobes are therefore formed by subdivisions of the larger right lobe. The *Spigelian lobe* is a small prominent division which lies between the fissure of the ductus venosus and that of the vena cava. These form its lateral boundaries, and anteriorly it is bounded by the transverse fissure. The Spigelian lobe is connected to the under surface of the great right lobe by the second lobe, of elongated shape, and known as the *lobulus caudatus* or *caudate lobe*. The last lobe is known as the *quadrate lobe*, and this division lies between the front portion of the longitudinal fissure and the gall-bladder. It is so named from its somewhat square shape, and is sometimes connected to the left lobe by a bridge-like process of liver-substance, which crosses the longitudinal fissure, and is known as the *pons hepatis*. Besides being invested by peritoneum, the liver is covered by a delicate coating of areolar or white fibrous tissue, which, however, sends no intimate prolongation of its substance into the body of the organ. This coating, at the transverse fissure, is known as *Glisson's capsule*, and surrounds the vessels which, as already mentioned, enter the liver by that channel, whilst it also invests them, in their distribution throughout the gland, in a common sheath or covering.

The entire and apparently solid mass of the liver consists of a collection of small portions of an oval or roundish shape, each averaging about 1-20th of an inch in diameter, and which are known as the *lobules* of the organ. When cut across the lobules appear somewhat rounded in shape, each consisting of a boundary wall and a contained mesh-work. The outer or boundary wall of each, and the mesh-work within, are formed by blood-vessels and ducts—portal vein, hepatic artery, hepatic vein, and hepatic duct—whilst the interstices of the mesh-work of vessels are filled with the little bodies which manufacture the characteristic secretion of the liver—the *hepatic cells*. These cells each average $\frac{1}{800}$th or $\frac{1}{1000}$th of an inch in diameter, and are of rounded or polygonal shape. They contain nuclei, granules, and fat globules, and have generally a yellowish tinge or hue. Bearing in

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mind that the hepatic artery, the portal vein, and hepatic duct accompany each other from first to last, and that the hepatic veins are distributed by themselves, we shall thereby assist our clear comprehension of the relations of these structures in the intimate composition and functions of the liver. The bile is secreted from venous blood derived from the stomach, intestines, and spleen. This venous supply is brought to the liver by the portal vein. The hepatic artery is the nutrient artery of the liver, and supplies the gland with blood for the nourishment of its own structure, just as all other organs are supplied with blood, and apart from their secreting duties. The hepatic duct, whilst accompanying the artery and vein in their distribution, is to be regarded as the excretory channel of the liver. Tracing these three vessels within the substance of the organ, we find them to ramify and subdivide, until the portal vein and hepatic artery appear to end in the minute capillary vessels which we have already seen to form a net-work in the substance of the lobules. Each lobule is thus invested by *interlobular veins*, given off from the minute branches of the portal vein, which pass between the lobules; and from these external veins the interior of the lobules is supplied by smaller veins, which form the net-work within the lobules, and which are known as the *intralobular* veins. The little *intralobular* veins gradually empty themselves into branches of the hepatic vein, which underlie the lobules; and the blood thus gathered from the lobules is finally poured into the main trunks of the hepatic vein which terminate in the inferior vena cava as it traverses the liver. The subdivisions of the hepatic artery end similarly to those of the portal vein, its blood being returned into the capillaries of the portal vessel, or into the venous net-work of the lobules. We thus find the distribution of the blood of the portal vein to be carried out to a very perfect and minute degree throughout the gland. It remains to be noticed how this blood is made subservient to the grand purpose of the secreting structures. The hepatic duct, which closely accompanies the portal vein and hepatic artery in their distribution, is now to be examined as the channel into which the bile, secreted by the hepatic cells from the blood of the portal vein, is formed. And the next step therefore leads us to trace the hepatic duct to its ultimate ramifications, and to its connection with the secreting cells of the liver. This connection, however, has not yet been thoroughly determined by physiologists, and the link in our knowledge which connects the secretion of bile with its excretion into the bile ducts, has yet to be furnished before our knowledge of the liver can be regarded as in any sense complete. There are, however, three chief theories, each of which professes to explain in what probable manner the hepatic ducts and liver cells communicate. Thus one theory maintains that the terminal and ultimate branches of the duct form a net-work or plexus (*biliary plexus*) which runs between the lobules, and which adjoins the outermost cells of each lobule, but has no intimate secretory connection with the interior of the lobule, and no intimate structural connection with the hepatic cells. The second theory urges that minute branches of the hepatic duct begin between the cells and within the lobules. Whilst the third theory, which has received the very general support of modern physiologists, is that the ultimate branches of the hepatic duct take origin in the lobules in delicate tubular prolongations which inclose the hepatic cells; or that the latter are thus situated within the expanded cellular prolongations of the hepatic duct, and that their secretion is thus directly poured into the duct. The hepatic duct and its branches are lined by epithelial cells. The larger ducts are also lined by mucous glands, and these receive the smaller ducts which come from between the lobules of the liver. The main hepatic ducts—one from the right and one from the left lobe of the liver—unite to form the single hepatic duct proper. And this latter duct communicates with the *cystic duct*, or that of the gall-bladder, the two forming by their union the *ductus communis choledochus* or common bile duct. The common duct is about 3 or 4 inches in length, and opens into the duodenum at its posterior portion in close proximity to the entrance of the duct from the *pancreas* or 'sweet-bread.' The characteristic secretion of the liver and the structure and uses of the gall-bladder have been already alluded to under the articles BILE and GALL-BLADDER. The general functions of the liver may, therefore, briefly be alluded to. These functions comprise, besides the secretion of bile, the elaboration from the blood of certain substances with the view to their more perfect assimilation. Thus the *albuminose* brought to the liver by the portal vein is probably further elaborated by the liver, and incorporated or assimilated with the blood. Then also saccharine matters contained in the blood, and derived from the food, undergo some change with a view to their ultimate utilization in the respiratory function, and specially in the production of animal heat. Of itself also the liver has been proved to secrete *glucose* or *grape sugar*, or at any rate to form a substance known as *glycogen*, or *animal starch*, which is readily resolvable into sugar. The sugar thus manufactured by the liver is supposed by some physiologists to be a purely normal product, of use as affording a source of animal heat when consumed in the lungs in respiration. But other authorities, denying the correctness of this view, maintain that sugar is only formed in the liver after death, or in diseased conditions. The entire functions of the liver may be regarded as comprising those of the arrest of albuminous matter, the decomposition of blood constituents, and the secretion of bile and glycogen, which latter is convertible into sugar. The bile, of use in digestion, becomes reabsorbed in the course of that process, and together with the sugar is ultimately used in the production and maintenance of animal heat. The functions of the liver, however, it must be remembered, form a subject which is still under active investigation by physiologists both at home and abroad. The diseases to which the liver and gall-bladder are subject, are very varied. Chief among its abnormal structural conditions may be mentioned that of *cirrhosis*, in which the fibrous tissue of the organ becomes greatly enlarged and hypertrophied, to the destruction of the cells and impairment of its functions; and also that of *fatty degeneration*, in which the oil-globules of the liver-cells become greatly increased in number, the tissue of the organ becoming very loose and friable. Both of these conditions are intimately associated with the abuse of alcoholic liquors. From its large size and prominence, as well as from the delicacy of the interlobular areolar or fibrous tissue, the liver is very liable to be ruptured by external violence, or even by the forcible action of the abdominal muscles. In a diseased state—especially when fatty or cirrhotic—the liver is more readily ruptured than when in a normal and healthy condition.

LIVER-FLUKE (*Distoma hepaticum*), the popular name of a genus of Trematode worms inhabiting the gall-bladder and bile-ducts of the sheep, in which animal they produce the disease known as the 'rot.' The liver-fluke may be regarded as a typical example of the Trematoda. It is somewhat oval in form, and flattened on both sides. Two suctorial discs exist, by

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means of which the animal adheres to its position in the interior of its host. The anterior sucker is perforated centrally by the mouth, the posterior sucker being a simple imperforate disc. The 'generative pore' or opening of the hermaphrodite reproductive organs, is situated between the two suckers. The mouth leads backwards into a curious dendritic or branched digestive system, two main trunks coming off near the mouth, and these giving off lateral branches, which end in cœca or blind extremities. A system of canals known as the *water-vascular system*, similarly branched, also exists, this latter arrangement opening towards the posterior part of the body in a small aperture. The nervous system exists in the form of a ring surrounding the upper part of the alimentary canal, and from this central ring, nerve-filaments radiate to adjacent parts. The liver-fluke lives by imbibition of the fluids of its host, and whilst this species of fluke has its definite situation in the liver of the sheep, other species inhabit other animals, and take up their abode in the alimentary canal, brain, eyes, &c., of some forms, chiefly birds and fishes. The *Diplostomum* is thus found, in numbers, in the eyes of the perch and other fresh-water fishes. In their development, these forms exhibit certain characteristic changes. The eggs are voided by the sheep, and such as escape into water undergo further development. The early embryo liberated from the egg, is abundantly ciliated, or provided with vibratile filaments, and it next takes up its abode within the body, generally of the fresh-water pond snail. Within the snail's body this first embryo produces a little sac or cyst, in the interior of which small bodies, provided with lash-like tails, and known as *Cercariæ*, are produced. These Cercariæ appear to escape in turn from the snail's body by the rupture of their investing cyst, and when swallowed by sheep, as in drinking, they penetrate to the liver, and there become developed into adult Distomæ. The 'rot' caused by these flukes is a disease well known to veterinarians, and is capable of producing serious, and even fatal effects in the sheep. (Pl. CXXVIII.–CXXIX. figs. 2 and 3.)

LIVERPOOL, an episcopal city, parliamentary and municipal borough, and seaport of England, in the county of Lancaster, on the right bank of the Mersey, about 4 miles from its confluence with the Irish Sea, 185 miles north-west from London. It stands partly on flat ground along the margin of the river, but chiefly on the slopes of a series of moderate eminences, whose summits are within the limits of the borough, and the highest of which is about 230 feet above the level of the quay-wall of the river. It is irregularly laid out, but, generally speaking, is well built, and it contains some magnificent public buildings. The general appearance of the town has been greatly altered in recent years by the formation of new streets and by the widening of many old ones. In the central districts in particular the densely-peopled courts and narrow unhealthy alleys have been opened or demolished, while the demolition of streets and houses, and the erection of vast piles of warehouses and offices, have in a great measure transformed the vicinity of the docks. Many of the new commercial buildings are of very ornate design. The classic style has always prevailed in Liverpool architecture, but Italian of a more or less enriched type is also a favourite style, some of the banks and other business premises being virtually reproductions of Italian palaces. The chief public buildings are the town-hall, municipal offices, St. George's Hall, exchange, public library and museum, art gallery, Picton Reading-room, the Wellington rooms, government offices (opened 1881), and Law Courts (opened 1883). The town-hall is an elegant structure. A handsome dome, surrounded by an open gallery, rises from the centre of the building. Within are a grand staircase, saloon, drawing-rooms, ball-rooms, banqueting-rooms, and a refectory, forming a superb suite of entertaining rooms, and also the council-hall, &c. The municipal offices were completed in 1868, at a cost of £160,000. The building is quadrangular, with its principal front, 226 feet long, in Dale Street, and having a depth of 195 feet. The central clock-tower and spire, about 200 feet high, is a conspicuous feature in the centre of the town. The Revenue Buildings, which comprise accommodation for the offices of inland revenue, for the Mersey Dock and Harbour Board, and for the post and telegraph offices, cover an area of 6700 square yards, and have an extreme length of 467 feet, and a total height of 67 feet; lofty porticoes, each of eight Ionic columns, adorn the centre and the east and west fronts; the centre is surmounted by a dome, and ornamented with pilasters. St. George's Hall, which contains a large hall for public meetings, concerts, &c., a smaller concert-room, and the assize courts, is a sumptuous building in the Corinthian style, externally and internally. The east front is 420 feet long, with a colonnade of sixteen columns 200 feet long; but from the south portico to the north apsis, which contains the small concert-room, the building is 500 feet long. The free public library and museum—erected at the sole expense of the late Sir William Brown, a Liverpool merchant, and now maintained out of the public rates—is a handsome building of the Corinthian order occupying an area of 4785 square yards. At present one portion of the building is devoted to the purposes of a reference library, now stocked with 70,000 volumes, for the free use of the public. The other section is apportioned to the museum, in which there are two great departments—namely, the natural history, bequeathed to Liverpool by the thirteenth Earl of Derby; and the antiquities, chiefly contributed by a private citizen, Mr. Joseph Mayer, F.S.A. A little to the east of the library and museum another local citizen, Sir Andrew Barclay Walker, has erected at his sole expense (upwards of £30,000) a gallery of art for the unrestricted use of the people. This splendid structure is already richly furnished with paintings and sculpture presented by other wealthy patrons of the arts. Between the museum and the art-gallery the town-council has erected a public reading-room, called the Picton reading-room, and has thus done all that remained to be done in order to place Liverpool in possession of a group of institutions devoted to art and letters, such as hardly another provincial town can rival. In connection with the central library there are two lending libraries, one at the north and the other at the south end of the town. The new exchange is an edifice of great magnitude, consisting of a centre and two wings, with a frontage of 1500 feet. The building, designed by Wyatt, is Renaissance, Italo-French in character, with a good deal of statuary and ornamental carving; it is four stories high, and has a massive and highly enriched central tower, and two others at the angles of the projecting wings. The other structures, exclusive of the churches, deserving of notice, include many splendid piles of commercial buildings, banks, and charitable institutions, the latter of which are numerous and magnificent. Those associated with maritime vocations are especially conspicuous and useful. Several new hotels have been built of a size and architectural splendour rivalling those of late years erected in London. The provision markets are spacious, airy, covered buildings, and are four in number. The Haymarket is an area of about 15,000 superficial yards, nearly half of which has been roofed over to form a drill-shed for the volunteer corps. This

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market is also used as a wholesale market for perishable produce. There is also the cattle market on a railway leading straight from the docks. There are altogether upwards of 200 places of worship in Liverpool; of these about seventy belong to the Church of England, over twenty to the Wesleyans, nearly as many to the Roman Catholics, fourteen to the synod of the Presbyterian Church of England, and twelve to the Independents. Many of the churches and chapels are very handsome buildings. Among these are St. George's, St. Catherine's, St. Michael's, St. Nicholas', St. Luke's, the Church for the Blind, Great George Street chapel, Hope Street Unitarian chapel, St. Francis Xavier's and St. Mary's Roman Catholic chapels, St. Andrew's Scotch Church, and Sefton Park Presbyterian Church. When Liverpool was constituted a bishop's see in 1880, the parish church of St. Peter was made the cathedral. Among the charitable and benevolent institutions are the royal infirmary, children's infirmary, northern and southern hospitals, lying-in institutions, dispensaries, &c. And in connection with these may be mentioned the public disinfecting establishments for gratuitously disinfecting the clothes, bedding, &c., of persons attacked by contagious or infectious diseases; and also the public baths, such as St. George's on the pierhead, those in Cornwallis Street, Margaret Street, Steble Street, &c. There are a blue-coat hospital, a male, female, and infant orphan hospital, a Roman Catholic male and female orphanage, penitentiaries, refuges for the destitute, and institutions for the relief of every form of human suffering. The educational establishments of Liverpool include the royal institution, the mechanics' institution, queen's college, Liverpool college, university college, the medical schools, school of art and gallery of art. There are also the national, industrial, and ragged schools, and those attached to the blue-coat hospital, orphan, and other asylums, besides the great educational machinery erected by the school board.

Though Liverpool is exceptionally deficient in squares and open spaces within the city boundary, there being only three of any pretentions, it is provided with an unusual number of public parks on the margin of the populous districts, and these are gradually being embraced within the limits of the town by the steady process of outward expansion. With the exception of Prince's Park, these recreation grounds have been provided by the corporation out of the rates, and they form a cordon round the town, available to the inhabitants of each quarter. Prince's Park, which is situated toward the south of the town, is private property, but the public are admitted to it without restriction. Further east are the botanic gardens and Wavertree Park, and beyond these are the park and grounds of Newsham House, which have been converted into a public park for the inhabitants of the east side of Liverpool. In the same vicinity another pleasant piece of land has been laid out as pleasure-grounds under the name of Shiel Park. At the extreme north of the town a park of about 160 acres has been laid out and planted in a very picturesque manner, the name of Stanley Park being given to it. But all these are eclipsed by Sefton Park, of 375 acres, at the extreme south of the town. The ground is naturally broken into hill and hollow, the heights affording beautiful views; about 200 acres are reserved for the park, the remainder being appropriated to villa sites. The adjuncts of the park embrace a 'Rotten Row' and carriage drives, botanical gardens, lakes, eleven cascades with rock-work, pavilions, and other ornamental buildings, a conservatory, fountains, &c. The land was bought from the Earl of Sefton for £251,177, and the laying it out amounted to about £200,000. The public cemeteries are nine in number, the most considerable of which are those of the parish of Liverpool at Anfield, the Toxteth Cemetery, the Necropolis, St. James' Cemetery, and the cemetery at Fazakerley. Liverpool is supplied with water partly from local wells, but chiefly from the catchment reservoirs in the hilly district between Bolton and Blackburn, distant from Liverpool 25 to 35 miles. At Rivington the collecting reservoirs form lakes of the aggregate length of 10 miles, and from these the water, after being filtered, is conveyed to the distributing reservoirs in town by iron pipes 44 inches diameter. The average quantity of water distributed daily is about 17,000,000 gallons, and the population supplied (which includes certain out-townships) is about 700,000. In 1880 the corporation obtained an act of Parliament authorizing them to procure an additional supply of water from the Vyrnwy in North Wales. The works (inaugurated in 1881) are now in progress, and are calculated to yield an ultimate supply for Liverpool of about 50,000,000 gallons per day, at an estimated total cost of 3¼ millions sterling.

Next to London—if it may even be said to be second to the capital, which it greatly exceeds in the value of its exports—Liverpool is the chief seaport of the United Kingdom. It is the main outlet for the manufactures of Lancashire, West Yorkshire, and Staffordshire, and carries on an immense export and import trade, especially with America. For the carrying on of this trade it possesses a magnificent series of docks and basins, and other requisites of a great seaport. The docks and basins extend along the Mersey for 8 miles. The river wall from the extreme north boundary of the Dock estate, near the Rimrose Brook, to the south boundary, near Dingle Point, is about 6 miles in length. There are thirty wet-docks and half-tide docks, among the largest of which are the Brunswick, the Queen's, Albert, George's, Prince's, Huskisson, Canada, Langton and Alexandra. The docks and commerce of the Mersey are under the charge of a separate trust, called the Mersey Docks and Harbour Board, constituted in 1857. This body, elected partly by the payers of dock dues and partly by the board of trade, is intrusted with the regulation of pilotage, lighting, and navigation of the estuary of the Mersey, with the making and management of the docks on either bank of the river, and with the general control of commerce and shipping. The present dock space comprises 490 statute acres, of which 333 acres, with 22 miles of quay space, is on the Liverpool side, and the remainder is at Birkenhead. This accommodation is being vastly extended by new works both at the north and the south extremities of Liverpool. The present bond debt of the Mersey Dock Board amounts to £16,000,000, and the works sanctioned by Parliament, and now in progress, will necessitate an addition of at least £6,000,000 or £8,000,000 to this total. The dock works on the Liverpool side form a long line skirting the river, and have been designed with consummate engineering skill and executed with a solidity that makes them the admiration of all beholders. They include docks specially adapted to distinct branches of trade, for example, corn, timber, American steamships, &c. On the margins of some of the docks are gigantic warehouses—those at Albert Dock being the largest—into which merchandise may be carried direct from the ship's hold into safe depositories. The quays are also abundantly furnished with railway lines and every other mechanical appliance for expediting the transport of goods and economizing labour. There are numerous graving docks for the repair of iron and wooden vessels, and gridirons for their casual over-

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haul. One of the principal river features of Liverpool is the floating landing-stage, moored off the Prince's and George's Docks, in the heart of the town. It is a magnificent structure, 2063 feet long, supported on iron pontoons, rising and falling with the tide, and connected with the river wall by bridges of easy gradient. It was constructed at a cost of £250,000, and just as it was being completed the carelessness of a gasfitter caused its total destruction by fire (July, 1874). The Dock Board at once commenced its reconstruction, and it was reopened on the original design in April, 1876. Its ample deck provides accommodation for the trade of the foreign-going passenger steamers, the coasting steamers, and the numerous ferry-boats that ply between Liverpool and the various towns and residential districts on the Cheshire side. In 1882 the number of vessels entered at the port of Liverpool was, 17,483 of 7,851,403 tons (7022 of 1,969,903 tons sailing vessels, and 10,461 of 5,881,500 tons steamers); the number cleared 16,625 of 7,550,948 tons. The total tonnage entered from foreign and colonial ports was 5,165,211; cleared for these ports 4,882,878. The shipping registered as belonging to the port on the 31st of December, 1882, was 1793 sailing vessels, with an aggregate burden of 1,013,148 tons, and 750 steamers of 691,565 tons; total, 2497 vessels of 1,704,713 tons.

Among the imports into Liverpool cotton holds the chief place, the quantity imported in 1882 being 14,579,597 cwts., the total quantity imported into the kingdom being 15,929,564 cwts., of the estimated value of £46,654,570. The cereals form another important item among the imports, the quantity imported in 1882 being 31,647,686 cwts., of which 20,033,561 cwts. were wheat, 4,079,612 cwts. wheat meal and flour, and 5,406,812 cwts. maize, all chiefly from North America. Other extensive imports are fruits, hides, palm and olive oil, provisions, wine and spirits, timber, tobacco, and wool. Cotton manufactures are the chief export; others are metals and articles in metal, machinery, woollens, &c. The value of the foreign and colonial merchandise imported in 1882 was £112,334,067; of the home produce exported, £91,247,543; amount of customs, £2,811,431. The manufactures and other industries of Liverpool consist chiefly of ship-building, hemp and wire rope making, sail-making, iron-forging, anchor and chain-cable making, iron and brass founding, the making of steam-engines and other machinery, sugar-refining, soap-making, alkali-making, &c. The manufacture of watches and chronometers is extensively carried on. There are many large steam-mills for grinding corn, rice, colours, dye-woods, &c.

There are four approaches to the town by railway, namely—by the London and North-Western Railway; the Lancashire and Yorkshire; the Midland, Great Northern, and Manchester, Sheffield, and Lincolnshire; and the Great Western to Birkenhead, and thence to Liverpool by ferry-boats. The station of the first-named railway, which is the famous Liverpool and Manchester line of Stephenson, is situated in Lime Street, opposite St. George's Hall. Originally the station had a long curtain-wall, ornamented by thirty-six Corinthian columns; but this façade has been replaced by a large hotel, belonging to the London and North-Western company, of stately architectural proportions and large internal accommodation. A tunnel 2230 yards long connects Lime Street station with the main line at Edge Hill; but this tunnel has now been reduced in length by the eastward extension of the station, which, when the works now in progress are completed, will cover an area of eight acres, devoted exclusively to passenger traffic. From Edge Hill there are also branch lines (subterranean) for the goods traffic to Wapping at the south docks and Waterloo at the north end; and there are likewise branches for passengers and goods *viâ* Walton to Bootle. The previous railway accommodation being inadequate to the growing traffic, three other companies—the Midland, the Great Northern, and the Manchester, Sheffield, and Lincolnshire—constituted themselves into a special organization under the title of the Cheshire Lines Committee to connect their several systems with Liverpool by means of a new extension. This is accomplished by a deep cutting from the south to the Central Station in Ranelagh Street (opened for traffic in January, 1874), and from this point direct communication is established with the main lines of the three companies named. The Central Station is a light and elegant structure, providing excellent accommodation for a large traffic. The Midland Company is also constructing spacious goods stations at the north and south of Liverpool. The Lancashire and Yorkshire Company, besides numerous goods stations, has a principal station close to the exchange—a handsome building, approached by broad and expansive flights of steps and carriage-ways; and this station, in common with that of Lime Street, is now being doubled in magnitude.

Liverpool is, next to London, the largest town in England. A vast number of its inhabitants are unskilled labourers, who resort to it for precarious and fluctuating labour connected with the port. It is now the most densely populated of our large towns. According to an estimate for 1876 there were 100·1 persons to the acre, while in Glasgow there were only 90·4, in Manchester 83·4, in Birmingham 44, and in London only 46. The mortality has been proportionately excessive. Parts of Liverpool lie low on a substratum of clay, and being densely peopled by the classes that are always found in sea-port towns their sanitary condition cannot be favourable. Within the parliamentary and municipal boroughs, which are coextensive, are included the parish of Liverpool, which formerly was the municipal borough, the townships of Kirkdale and Everton, part of the township of West Derby and of the extra-parochial place of Toxteth Park. The town is divided into sixteen wards, which send each three councillors to the council. There are thus forty-eight councillors; there are also sixteen aldermen, elected by the council, and a mayor. The parliamentary borough returns three members to Parliament.

Great as Liverpool now is, it is of but comparatively recent growth. A castle is said to have been built here by Roger De Poictiers, to whom William the Conqueror is stated in Domesday-book to have given the extensive tract of land between the Mersey and the Ribble. It is also stated that the castle was held by King John, and the custody of it belonged for a long time to the noble family of Molyneux, whose chief seat is in the neighbourhood at Sefton. Camden speaks of 'Litherpoole, Saxon Liverpole, commonly called Lirpoole,' as the place 'where is the most convenient and most frequented passage to Ireland, a town more famous for its beauty and populousness than its antiquity.' The conquest of Ireland gave the first stimulus to the commerce of Liverpool, which, in consequence of its situation relative to that country, soon became a town of importance. In the latter part of the sixteenth century the town declined, containing in 1565 only 138 houses, and in 1571 it was mentioned in a petition to the Queen Elizabeth as 'her majesty's poor decayed town of Liverpool.' In her reign, however, a mole was formed for laying up ships in winter, and a quay was constructed. In 1636, when Charles I. issued

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writs for the exaction of ship-money, Liverpool was rated at £20, Chester at £25, and Bristol at £1000. In 1644 it was a small fishing town surrounded by a high mud wall. In that year it was besieged and taken by Prince Rupert, and shortly after retaken by the parliamentary forces under Sir John Meldrum. In September, 1645, the Parliament settled the mill and ferry-boats on the corporation as a satisfaction for their losses. A great part of the town having been burned, 500 tons of timber were allowed for rebuilding it; and it was ordered that the timber should be felled on the estates of the Earl of Derby, Lord Molyneux, and other local noblemen. During the civil wars the town was fortified, but the fortifications were afterwards dismantled. From a manuscript of Sir E. More in 1667, still extant, it is shown that the site at that time occupied with buildings was confined to the elevated ground on which Castle Street now stands, and a few short streets running north and north-east from the ancient town-house, the inlet along Whitechapel being the natural boundary of the town. In 1699 Liverpool was separated from Walton-on-the-Hill and made a parish by itself. In 1709 a wet-dock was constructed, not only the first in Liverpool, but also in the kingdom. From this event may be dated the rapid extension of its commerce and population; though the great increase of population has taken place since the beginning of the present century. In 1880 Liverpool was made the see of a bishop, and in that year a charter was granted to it, constituting it a city. The population, which in 1801 was only 77,653, in 1861 was 443,938, in 1871 492,935, and in 1881 552,508, or including suburbs 681,936.

LIVERWORTS, or HEPATICÆ, a natural order of cryptogamous plants, intermediate between the lichens and mosses. They are either spread out in the form of simple lobed membranes, through which runs a middle nerve, or they are composed of a small ramified stem bearing sessile leaves. The sporules are arranged in various ways, sometimes at the surface of the frond, sometimes at the base of the ramifications. The Hepaticæ are generally distributed over the world, and prefer situations similar to those occupied by the mosses.

LIVERY (French, *livrée*). At the plenary courts in France, under the sovereigns of the second and third races, the king delivered to his servants, and also to those of the queen and the princes, particular clothes. These were called *livrées*, because they were delivered at the king's expense. The expense of these donations, together with that of the table, the equipages, the presents for the nobles and the people, amounted to an immense sum. A prudent economy afterwards suppressed these plenary courts, but the livery of the servants still remained. In London by *livrey* or *livery men* are meant those freemen of the city who belong to the eighty-one city companies which embrace the various trades of the metropolis. Up till the passing of the reform bill in 1832 they had the exclusive privilege of voting at the election of members of Parliament and of the lord-mayor. Out of this body the common council, sheriffs, aldermen, and other officers for the government of the city are elected.

LIVINGSTONE, DAVID, one of the most famous African explorers, was born at Blantyre, Lanarkshire, 19th March, 1813. His great-grandfather was a native of the Highlands, a zealous adherent of the Stuart cause, for which he fought and fell at Culloden. His grandfather was originally a small farmer in the island of Ulva, but having found the farm insufficient for the support of a numerous family he removed to Blantyre, and obtained employment for himself as confidential messenger and for his sons as clerks in the cotton works of that place. The future traveller's father afterwards settled as a tea dealer in Hamilton, and held for the last twenty years of his life the office of deacon in an Independent church there. His circumstances were never flourishing, and David at the age of ten entered the cotton factory as a 'piecer.' While in this situation, though working from six in the morning till eight at night, he found time to learn Latin, and by the age of sixteen, thanks to his own energy and such assistance as he could find at an evening school, he was well acquainted with Horace, Virgil, and other classical writers. As he grew up to manhood he read extensively, especially scientific works and books of travel, and his home training being essentially a religious one the idea sprang up within him of becoming a pioneer of Christianity in China. With this end in view he resolved on obtaining, among other qualifications, a good medical education. Promoted in his nineteenth year to cotton-spinning he was enabled, by working extra hours during the summer, to attend the winter medical and Greek classes at Glasgow University, as well as Dr. Wardlaw's divinity lectures, without a farthing of aid. In 1838 he was admitted a licentiate of the Faculty of Physicians and Surgeons of Glasgow. Having joined the London Missionary Society he made preparations for starting as a medical missionary to China; but as the opium war in that country was raging it was deemed better under the circumstances that he should go to South Africa, where the venerable Robert Moffat had opened an inviting field for missionary labour. After further theological studies under the auspices of the liberal-minded missionary society he embarked for Africa in 1840, and after a three months' voyage reached Cape Town. His first station was at Kuruman, in the Bechuana territory, 700 miles from the Cape, at which place and in Mabotze he remained several years, making himself acquainted with the habits, laws, and language of the natives. About this time he married the daughter of Mr. Moffat, who had founded the station, and shortly afterwards moved farther north to Kolobeng. Here he heard from the natives of a great lake on the north of the Kalahari Desert, and on 1st June, 1849, accompanied by Messrs. Oswell and Murray, who had come from India on a hunting expedition, he started for the purpose of discovering it. They had to take a long circuitous route to the eastward to avoid the desert, and after a toilsome journey of 300 miles they reached, on the 4th July, the beautiful valley watered by the Zouga. Hearing that this stream flowed out of the lake of which they were in search Livingstone and his companions left their waggons to follow the windings of the stream, embarked in a canoe, and were paddled into Lake Ngami (1st August), never until then beheld by European eyes. In the following year he made a second journey, along with his wife and children, to the same region, with the intention of finding a new field for missionary labour and a more favourable site for a station. The whole party, however, were stricken down by fever, and compelled at last to return to Kolobeng. In 1851 he started north for the third time, in company with Mr. Oswell. After reaching his old point on the Zouga he left Ngami on his left hand and struck due north, and then north-west through arid salt plains and limestone regions covered with baobab or mowana trees, until he arrived at Linyanti, the capital of the Makolólo territory, a country of rivers and swamps and fertile valleys. The town itself is situated on the Chobe, which, Livingstone was told, joined a still mightier stream. The unwearied traveller set out on horseback to test the truth of this report, and came upon the Zambesi, the largest river

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in South Africa, flowing eastwards from the centre of the continent. On his return to Kolobeng he wrote to the London Missionary Society proposing to devote several years to the exploration of this region, and requesting their consent and co-operation. He received not only the necessary sanction but also the means for carrying out his enterprise, and went to Cape Town with his wife and family for the purpose of sending them to England. On the 8th of June Dr. Livingstone started from Cape Town on his fourth journey. Being fortunately detained on his way at Kuruman he received the intelligence that Pretorius, the leader of Trans Vaal Boers, had sent 400 men to attack the station at Kolobeng. They burned down the village, killed about sixty men, and carried away many women and about 200 of the school children for slaves. Livingstone's house was plundered, his books torn to pieces and scattered about, and all property in the village taken away. Having returned to Kolobeng and remained some time among the wretched inhabitants he prepared for his journey northwards. He set out on the 5th January, 1853, and on the 23d May reached Linyanti after great difficulty, owing to the floods. The chief Sekeletu and the whole population of the town, numbering between 6000 and 7000, welcomed him with great enthusiasm and kindness. From the Makolólo capital he first made a voyage to the Zambesi, and returning thence to Linyanti he set out on the 11th November, accompanied with twenty-seven natives of the Makolólo tribe, on a journey of exploration to the western part of the continent. They travelled partly by land and partly by water in canoes. They ascended the Leeambye (Upper Zambesi) till they reached its affluent the Leeba, flowing from the N.N.W., which they ascended for some distance, and then journeyed overland to Lake Dilolo. Thence, with much difficulty, caused by repeated fevers, famine, and frequent danger from hostile natives, they proceeded till they reached the Quango, which they crossed, and were then subject to the protection of the Portuguese, who treated them with great kindness, until their arrival at St. Paul de Loanda, the capital of Angola, on the west coast of Africa, in August, 1854. The country they traversed is of exuberant fertility, intersected with innumerable rivers, densely wooded, and full of mineral wealth. He remained at this place to recruit his shattered health until the 20th September, when he set out upon his return journey to Linyanti, which was reached in about a twelvemonth. Starting on the 3d November, 1855, from that place again, accompanied by several natives, he struck boldly down the Leeambye on his way to the east coast. He found the Leeambye and Zambesi to be identical, the river taking the latter name below the Victoria Falls. In May, 1856, he reached Quilimane on the east coast, where the northern mouth of the Zambesi opens into the Indian Ocean, having thus accomplished in four years the unparalleled feat of crossing the continent of Africa in these latitudes from sea to sea. After this stupendous journey Livingstone returned (12th December, 1856) to England, whither the fame of his discoveries had preceded him, and he was received by his countrymen with great enthusiasm. Pressed to give to the world a record of his travels he at first refused, but yielding at last to repeated demands he published a bulky volume entitled Missionary Travels and Researches in South Africa (London, 1857). In March, 1858, he set sail for Quilimane, having been appointed British consul at that place, and furnished by government with means to pursue his explorations into the interior. The first of these expeditions, in which he was accompanied by his brother Charles, Dr. Kirk, and others, added the accurate knowledge of Lakes Nyassa and Shirwa to the map, besides collaterally enriching our natural history and botanical collections by the labours of his colleagues. In this journey he had the misfortune to lose his brave and noble-minded wife, who died 27th April, 1862, at Shupanga Creek, on the river Shiré. During this journey also he was horrified by the effects of the slave-trade, which were terribly evident in the country round Lake Nyassa. After having completed in several other expeditions the survey of the Zambesi river system he returned to England in 1864. On the following year he again set out for the purpose of making further explorations. One of the principal objects he had this time in view was to set at rest, if possible, the question of the sources of the Nile, left unanswered by the researches of Burton, Speke, Grant, and Baker. Skirting Lake Nyassa his intention was to explore its northern shores, and pushing forward to investigate the water-shed between it and Lake Tanganyika, which had been visited but not explored by Speke. Landing, therefore, at the mouth of the Rovuma, he pushed up the valley, striking direct for Lake Nyassa. Long before reaching the northern extremity of the lake, however, his native followers deserted him, and returned to the coast with an account of the intrepid traveller's death at the hands of a hostile tribe. Dr. Kirk at Zanzibar and Sir R. Murchison in England refused to believe the tale, suspecting, rightly, that it was got up by his followers to account for their return. An expedition was sent out at the expense of government, headed by Mr. Young, the principal result of which went to prove that Livingstone was not killed at the place named by his men, and that he had advanced in safety a five days' journey beyond. This intelligence was confirmed shortly afterwards by the arrival of letters from Livingstone himself dated four months later than the time of his supposed death. From these letters it transpired that Livingstone had struck round by the southern extremity of Lake Nyassa, and pushing due westward across the water-shed which divides the tributaries of the Zambesi from those of the lakes had turned northwards at a point about 170 miles west of the Shiré. Thence he held almost due north, and after leaving the valley of the Loangwe, which joins the Zambesi at Zumbo, ascended what turned out to be the southern edge of an elevated plateau, varying from 3000 to 6000 feet above the sea-level, well wooded and watered. Entering the Cazembe's dominions he crossed the Chambeze in latitude 10° 34′ S., arrived in February, 1867, at a place called Bemba, situated on the plateau, at the altitude of 4500 feet above sea-level, and two months later pushed on until he discovered Lake Liemba. He proceeded to explore a river-like portion of it, which was said to flow into Lake Tanganyika; but a war breaking out between a native chief and some ivory traders he was compelled to desist. Having been supplied with stores by some friendly Arab traders he was enabled to reach (September, 1867) Lake Moero, the second of the lakes through which the Chambeze flows, and about 60 miles west of Tanganyika. All his attempts to reach Ujiji, which is situated on the east shore of Lake Tanganyika, and where he knew stores and letters were awaiting him, failed, owing to the inundated state of the country. For about three years after this all communication between the explorer and his friends was cut off, owing to the unsettled state of the country. A second expedition was fitted out from England under the command of Lieutenants Dawson and Henn, accompanied by W. Oswald Livingstone, a son of the great traveller. They arrived at Zanzibar in the early part of 1872, and landed on the

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neighbouring coast at Bagamoyo. But here they were met on the 7th May by H. M. Stanley, the special correspondent of the New York Herald, who had left the object of their search in good health at Unyanyembe, about fifty days' march from the coast. He had found Dr. Livingstone on the 3d November, 1871, at Ujiji. They had lived together during the winter exploring the northern coasts of Lake Tanganyika, and Livingstone had accompanied the intrepid American as far as Unyanyembe, half way between the lake and the sea-coast. They separated in March, 1872, at which time it was Livingstone's intention to return to Ujiji, and thence to cross over or go round the southern end of Lake Tanganyika, to finish his explorations of the more westerly chain of lakes and rivers which he had discovered flowing northward from the Chambeze and Lake Bangweolo. Fully equipped with stores from Dr. Kirk and the relief expedition he set out in the summer to complete his explorations of the Lualaba river. After rounding Tanganyika and visiting Lake Bangweolo he pushed on for Katanga; but stricken down with dysentery, after much painful travelling in the attempt to reach Ujiji, he bade his followers build him a hut to die in at Ilala, near Lake Bangweolo, where he expired 1st May, 1873. His body was disembowelled and filled with salt, and carried by his faithful attendants to the coast, whence it was conveyed to England, and solemnly deposited in Westminster Abbey, 18th April, 1874.

LIVIUS, TITUS, PATAVINUS, often called LIVY, a celebrated Roman historian, born at Patavium (Padua) in the year 59 B.C. Nothing is known of his life except that he came to Rome, secured the favour of Augustus, and became a person of some consequence at court, that he was married, and had at least two children, and that he died in his native town, according to some authorities A.D. 11, and to others, A.D. 16 or 17. His history of Rome, to which he devoted twenty years, rendered him so celebrated that a Spaniard is said to have gone from Cadiz to Rome merely for the purpose of seeing him. Other and untrustworthy statements regarding him are that he began life as a rhetorician, and wrote upon rhetoric, that he was twice married, that he spent much of his time at Naples, &c. In the fifteenth century his body was supposed (but erroneously) to have been discovered at Padua, and a splendid monument was raised to his memory. His Roman history begins at the landing of Æneas in Italy, and comes down to the year of the city 744 (B.C. 9). His style is singularly beautiful, the narrative flows gracefully and yet energetically; the descriptions are singularly lively and picturesque, and there are few specimens of oratory superior to that of many of the speeches with which his narratives are interspersed, although they have been characterized as too polished and elaborate to be suited either to those to whom they are ascribed or the audiences to which they are represented as addressed. His style was accused (see Quintilian, viii. 1) of having 'a smack of Padua' (*patavinitas*), but scholars have not been able to discover any traces of it. His whole work consisted of 140 or 142 books, of which we have remaining only the first ten, and those from the twenty-first to the forty-fifth, or the first, third, and fourth decades, and half of the fifth. Of all the books, however, except two, we possess short epitomes or tables of contents, which are very valuable so far as they go. Some have ascribed these epitomes to Livy himself, others to Florus. In the first ten books the history extends from the foundation of Rome B.C. 753 to the year 294 B.C.; the portion between the twenty-first and forty-fifth books contains the account of the second Punic war and the history of the city between B.C. 219 and 201. The fourth and the half of the fifth decade bring down the history to the year B.C. 167. The best editions of Livy are those of Gronovius (Amsterdam, 1679, three vols.), of Drakenborch (Leyden, 1738–46, four vols., several times reprinted, and still the standard edition); and, among the later editions, those of Ernesti, Schäfer, Ruperti, and Döring. The earliest English translation is that by Philemon Holland (1600, folio); there is also one by George Baker (six vols. 1797), which has been often reprinted, and a literal one of four vols. in Bohn's Classical Library.

LIVIUS ANDRONICUS, the father of Roman poetry, by birth a Greek of Tarentum, first went to Rome at the commencement of the third century B.C. as instructor to the children of Livius Salinator. He introduced upon the Roman stage dramas after the Grecian model, and, besides several epic poems, wrote a translation of the Odyssey in the old Saturnine verse. We have only a few fragments of his writings.

LIVONIA, LIEFLAND, LIFLAND, LIVLAND, or RIGA, a government of Russia, bounded north by Esthonia, west by the Baltic Sea, south by Courland, and east by Vitepsk and the Lake of Peipus; length, 178 miles; breadth, 111 miles; area, about 17,800 square miles. The surface is for the most part flat, sandy, and swampy, but has occasional tracks of black loam, well fitted for the plough. The only hilly ground is in the districts of Venden and Dorpat. The government is well watered, possessing numerous rivers and lakes. Of the former the principal are the Dwina or Duna, and Embach; of the latter, the Vertserf and Luban. The climate is subject to great extremes of heat and cold. Notwithstanding extensive tracts of sand, the greater part of the government is under cultivation, and yields good crops of oats, barley, wheat, potatoes, flax, and hops. The forests are extensive, and furnish good timber. Horses, cattle, and sheep are generally of small inferior breeds. Distilling, sugar refining, and the manufacture of tobacco, woollens, cotton, and linen, are the chief branches of manufacturing industry. The inhabitants consist of Livonians, that is, Germans and Russians, who form the landed proprietors and governing class, and are divided into the nobility and bourgeoisie; and Esthonians and Letts, who form the peasantry, and though no longer serfs (having obtained their freedom in 1824), are bound to perform certain oppressive duties for the lords of the soil. The Esthonians occupy the north and east portion of Livonia; the Letts the south and west. The Esthonians are of the Finnish stock (see FINNS); the Letts, like the Lithuanians, belong to the Slavonic stock, and speak a language of their own (Lettish). Of the Lives or Livonians proper, the original inhabitants of the country, who are also of Finnish race, only a thousand or two are all that are left. The inhabitants are almost all Protestants of the Augsburg Confession. The capital is Riga. Pop. 1,117,074.

LIVRE, an ancient French coin. See FRANCE —(Weights, Measures, and Money.)

LIVY. See LIVIUS.

LIXURI, a seaport town in Cephalonia, one of the Ionian Islands, on the west side of a long, narrow arm of the sea, which penetrates the island from north to south. It is a principal depot for wines and currants; the shores are deep, and favourable for erecting wharfs and landing-places, while the country around yields a large produce for exportation. Pop. 6000.

LIZARD. This term has been popularly and erroneously used to include such animals as the Newts or Tritons, together with a vast number of reptiles which resemble them in general form. Zoologically,

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the term is restricted to animals belonging to the order *Lacertilia* of the class of Reptiles—the Newts, &c., being *Amphibian* animals, and finding their proper place in that class of Vertebrates with the Frogs, Toads, and allied forms. The characters of the Lacertilia or lizards are found, firstly, in the general, though not universal, presence of limbs. Two pairs of limbs are usually present, but one or both pairs may be absent, and the digits or toes may vary in number from two to five. Though the front limbs may be wanting, the pectoral arch or bones of the shoulder-girdle are still represented; but when the hinder-limbs are wanting, the pelvic arch also disappears. The spine is generally elongated in the lizards, and a tail of considerable length is generally present. In existing lizards not more than nine vertebræ are found in the cervical or neck region, although in several extinct forms a greater number was attained. In most Lacertilia the vertebræ or joints of the spine are either hollow in front and convex behind (*procœlous*), or hollow at both ends (*amphicœlous*), the former condition being much more common than the latter. Only two genera, the Geckos and *Sphenodon*, possess amphicœlous vertebræ. The tail bones of many lizards are divided in the centre by a thin cartilaginous plate. These structures constitute so many weak points in the tail, and when seized by the caudal extremity, the tail readily parts or breaks off owing to this conformation. The sacrum is composed generally of two, rarely three vertebræ. The vertebræ are provided with a single short transverse process at each side, and the ribs are generally well ossified and numerous. The cervical or neck-vertebræ may be furnished with ribs, and those of the back or dorsal region generally become united to the sternum or breast-bone. In the Flying Lizard (*Draco volans*. See DRAGON) some of the hinder ribs become elongated and extended to form a support for the patagium or wing-membrane, by which this lizard is enabled to sustain itself in the air. The upper jaw and facial bones are firmly united to the skull, as also are the mastoid and tympanic bones which support the lower jaw. These points mark off the lizard's skull from that of the serpent, in which considerable mobility is permitted between these bones. The halves of the lower jaw in lizards are almost invariably firmly united together in front, and are thus incapable of being widely separated as in the snakes. The teeth are not absolutely confined to the jaw-bones. They are simple in structure, and are not lodged in distinct *alveoli* or sockets, although they generally become attached by anchylosis or bony union to the jaw-bones with age. Various important distinctions among the lizards have been founded upon the manner in which the teeth become united to the jaw in age. Thus the *Pleurodont* lizards are those in which the teeth become attached by their sides to the jaw; the *Acrodonts* are those in which the teeth are attached by their bases to the summit of the jaw; and the extinct forms, which had teeth lodged in sockets, are known as *Thecodonts*. The crowns of the teeth vary much in form. They may thus be sharp and conical in shape, as in the Monitors; or sharp and knife-like, with toothed edges, as in Iguana; or with broad, spherical crowns, fitted for crushing, as in Cyclodus. Fresh teeth appear at the bases of those already formed. The tongue of lizards may be thick, fleshy, and protrusible only on the opening of the mouth; or, on the other hand, the tongue may be cleft at its extremity (bifid), and furnished with a horny sheath, from which it may be protruded at will, and from the mouth through a special notch, when the jaws are closed. The former conformation of the tongue has given to those lizards which possess it the names of *Pachyglossa* or *Brevilinguia;* and to those possessing the latter conformation the terms *Fissilinguia* or *Leptoglossa* have been applied. The eyes are provided with movable eyelids, whilst the ear is usually to be perceived externally. A breast-bone is almost invariably present. The skin is generally covered with scales or horny plates, although the integument—as in the chameleons, &c.—may be soft. In their reproduction they never undergo any metamorphosis, and are generally *oviparous*, that is, produce eggs from which the young are afterwards hatched. But some lizards, for example the Scaly Lizard (*Zootoca vivipara*) of Britain, are viviparous, the eggs being retained within the parent's body until such time as the young are nearly or actually hatched. The chief families of the order of Lizards or Lacertilia, are the *Chalcidæ* of the East Indies and South America; the *Scincidæ*, or Skinks; the *Lacertidæ*, or True Lizards; the *Varanidæ*, or Monitors; the *Geckotidæ*, or Geckos; the *Iguanidæ*, or Iguanas; and the *Chamæleontidæ*, or Chameleons. The Lacertidæ, forming the typical family of the order, merit a few words of notice in the present instance. In this family the body is covered with scales, which are largest on the abdomen and the head. The head is not provided with a throat-pouch. The legs are always four in number, and the toes number five, and are unequal in length. The tail is cylindrical, elongated, and is often longer than the body. A third eyelid, or 'nictitating membrane,' is present. The tongue is cleft or bifid, and protrusible. The teeth are curved in shape, and are inserted in a slight groove or furrow of the jaw. They have hollow bases. In their distribution these lizards exclusively belong to the Old World. The Scaly or Viviparous Lizard (*Zootoca vivipara*) and the Sand Lizard (*Lacerta agilis*) are British species. The Green Lizard (*L. viridis*) of the Continent and Jersey is also a common form. *Lacerta ocellata* is a familiar species in Southern Europe and North Africa. The American representatives of the Lacertidæ are the Ameivæ, constituting the family *Ameividæ*. These latter forms have solid teeth, implanted in a deep groove or furrow in the jaws. (PL. CLXX.-CLXXI. figs. 1-6.)

LIZARD POINT, a headland, England, in the county of Cornwall, forming the most southern point of Great Britain, 24 miles E.S.E. of Land's End, and having two lighthouses with fixed lights 224 feet above sea-level; lat. 49° 57′ 42″ N.; lon. 5° 12′ W.

LLAMA (*Auchenia*). The llamas of South America represent in the New World the camels of the Eastern Hemisphere. They are included in the family of the Camelidæ or Tylopoda, and agree with the camels in being devoid of horns, and in walking upon the lower and broadened surfaces of the third and fourth toes. These are the only developed toes, the rudimentary hinder toes of most other Ruminants being completely wanting in these animals. The nails of these toes, instead of being hoof-like, resemble ordinary flattened nails. The broad sole-like surfaces of the toes are covered by horny cushion-like pads of skin, which, in the camels only, unite the toes, and upon which the animals walk. The nostrils are capable of being closed at will. In their dentition the camels and llamas agree; the arrangement of the teeth presenting features of difference from that of most other Ruminants. These features consist in the presence of two incisor and two canine teeth in the upper jaw; the typical Ruminants having no upper canines or incisors. The llamas differ from the general characters above stated, in the complete division or separation of the two toes, each toe having a distinct pad or cushion to itself. The nails are also curved, and the entire structure of the llama's foot clearly adapts it less for travelling over sandy deserts than for climbing, and for inhabiting mountainous

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districts. In the llamas there are no humps developed. They are much smaller animals than the camels, and the neck is elongated, the head being of small size. The upper lip is capable of movement, and is deeply cleft. The legs are slender and well-formed; the ears long and pointed and very mobile; the eyes are large, and the whole aspect of the llama is somewhat deer-like and highly elegant. The tail is short and curved downward. Considerable doubt exists as to the number of species, or as to what forms are to be regarded as species, and what as mere varieties. Thus four forms are known, the Llama proper (*Auchenia Llama*); the Alpaca (*A. Paco*), by most writers considered as a domesticated variety of the true llama; the Vicugna, or Vicunia (*A. Vicunia*); and the Guanaco (*A. Guanaco*), the latter being regarded by some, as the wild or original stock from which the true llama has been derived. Cuvier admits only the llama and vicugna as separate species, and regards the alpaca as a variety of the llama. The most modern view would appear to be that of recognizing the specific nature of the four forms, admitting at the same time the possibility of the derivation of one or more species from the others. The llama proper inhabits Peru and Chili, to the inhabitants of which countries it fully supplies the place of the eastern camels. The colour is generally chestnut-brown with white patches, the body being covered with a thick fur. It stands about 3 feet high at the shoulder, the neck and head being carried about 5 feet above the ground. The length is about 6 feet. In the early days of Peruvian discovery the llama was the only beast of burden employed in the country. Its load rarely exceeds 120 lbs., but its great value consists in its being able to traverse mountainous paths along which less sure-footed animals would be unable to pass. Its usual daily journey averages 12 miles. The llamas are completely domesticated. They live in flocks, which return nightly to the owner's fold of their own accord; and they breed freely in the tame state. The period of gestation is five months, and the female produces only one at a birth. The age of three years is stated as the period of full development, and about twelve years is said to be the limit of age. Like the camels, the llama lies down to be loaded, and when wearied or capricious no amount of blows will compel these animals to proceed on their journey. The herds occasionally number over 100 individuals, and their chief food appears to be a kind of mountain grass known as *ycho*. They rarely drink when well supplied with green herbage. The tame and wild species also are said to possess the curious habit of generally dropping their dung in the same spot—the excrement accumulating from this habit in considerable mounds. The wild species are also said to retire to particular spots to die—large collections of the bones of these animals attesting the apparent truth of the statement. The flesh of the llama is considered very wholesome, especially when taken from the young animal. The wool is much used among the native Indians, but is exported, as is also that of the wild species, for the manufacture of textile fabrics. The skin is employed in the manufacture of a leather much prized by the natives for shoes and for making harness. The dried dung is used for fuel, and the milk is also employed as an article of native diet. When irritated these animals have the habit of kicking at their adversaries, and they also eject the food when undergoing re-mastication in the mouth, along with quantities of saliva. This rejected matter is considered venomous by the natives, but it merely appears to possess a slightly irritative power when applied to the skin, if, indeed, it has any effect at all. As showing the immense numbers of these animals in former years in Peru, De Bolivar states that in his time 4,000,000 were annually killed for food, and 300,000 were employed in the Potosi mines.

The Guanaco is a wild species inhabiting the Andes from Peru southwards to the Straits of Magellan. In Patagonia they occur in large herds, but further north the herds number only a few individuals in each. The colour is a reddish-brown, and the hair is long, but of a rougher texture and less woolly than the llama. These forms are hunted for the flesh, skin, and hair. The Alpaca is found chiefly in Peru. It is of smaller size than the preceding species, and is domesticated chiefly for the sake of the long woolly hair, celebrated in the manufacture of certain fabrics. The Vicugna, or Vicunia, is about the same size as the alpaca. Its colour is light-red or yellowish-brown on the back, inclining to white on the under parts. It inhabits the Andes of Peru and Chili, and lives generally at a great elevation, and near the snow-line. The wool is exceedingly fine and soft, and is much valued by the Peruvians, who manufacture fabrics of great delicacy from it. (Pl. XXXVI.–XXXVII. fig. 2.)

LLANDAFF (*Llan Tâf*, Church of the Tâf), an ancient and decayed city of South Wales, Glamorganshire. It is now a mere village, with 570 inhabitants, agreeably situated on the right bank of the Taff, 2 miles north-west of Cardiff, with a station on the Taff Valley and Aberdare Railway. It is only noted for its cathedral, built in the twelfth century, but subsequently repaired and contracted in 1751, when a new Grecian west front was added to the original Gothic one, imparting to the whole edifice a singularly incongruous appearance; its entire length is 300 feet; breadth, 30 feet. It has of late years undergone extensive restoration. Adjoining it are the chapter-house, in the decorated English style, and the remains of the episcopal palace.

LLANELLY, a market town and parliamentary borough, South Wales, in Carmarthenshire, situated on the Bury, 14 miles south by east of Carmarthen, on the Great Western Railway thence to Swansea and various other places. It is the outlet for the products of a great mining district, comprehending extensive collieries, iron-foundries, copper works, large tin works, and lead and silver works in which a large number of the inhabitants are employed. There is a street tramway. The trade is facilitated by four commodious docks, from which great quantities of coal are exported to France, Spain, and the Mediterranean. In 1882 there entered at the port 1600 vessels, tonnage 161,326; and cleared 1759 vessels, tonnage 160,088. It unites with Carmarthen in returning a member to Parliament. Pop. of urban sanitary district, 19,670.

LLANGOLLEN, a market town, North Wales, in the county of Denbigh, 21 miles south-east of Denbigh, on the Vale of Llangollen Railway, picturesquely situated in a narrow valley on the right bank of the Dee. It is well built, and has a handsome ancient church, in the early English style. In the town and neighbourhood are extensive mills, where flannel of superior quality is manufactured; and several breweries. Flag, slate, and limestone abound in the vicinity. Four miles from the town the Ellesmere Canal is carried across the Dee by the magnificent aqueduct of Pontcysyllte, of 19 arches, and 126 feet high, constructed by Telford; a mile lower down the Dee Viaduct (also of 19 arches) carries the railway over the river. Near the town are the picturesque ruins of the fortress Castell Dinas Brân. Llangollen is much admired for the beauty of its situation, and greatly resorted to by summer visitants. Pop. 3123.

LLANIDLOES, a municipal and parliamentary borough of Wales, in Montgomeryshire, in a fertile valley on the Severn, here crossed by two bridges, and on the Mid-Wales Railway, 18 miles north-

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west of Montgomery. The parish church is one of the most beautiful in Wales. Flannel manufacture is actively carried on, but not to the same extent as at one time. In the town and vicinity are several factories for wool-carding and spinning, fulling mills, brass foundries, extensive copper and lead mines, malt kilns, flour mills, and tanyards; there are extensive sheep-fairs. It unites with Montgomery and other places to return a member to Parliament. Pop. 3421.

LLANOS, the name given in the northern part of South America, particularly in Colombia, to vast plains, almost entirely level, and interrupted only by detached elevations, called in Spanish, *mesas*. The superficial area of the *llanos* is estimated at 296,800 square miles; they extend from the coast of Caracas to Guiana, and from Merida to the mouth of the Orinoco and the Amazons. A large portion of them is sandy and without much vegetation, except on the banks of the rivers and during inundations; some fan-palms are found. When the inundations occur the beasts take refuge upon the *mesas*. They are distinguished into the (*a.*) *Llano of Colombia*, extending from the mountains of Caracas to the mouth of the Orinoco, and to the mountains of St. Fé, and containing several *mesas* (de Amana, de Guanipa, de Paja, 50 to 65 feet in height), which, in the rainy season, are covered with rich verdure, and inhabited by herds and flocks of all descriptions.—(*b.*) *Llano de Casanare*, a continuation of the former, between the Orinoco, Meta, and Sinaruca.—(*c.*) *Llano de S. Juan*, very fertile, woody, often so thickly overgrown that it can only be penetrated by means of the numerous rivers; it lies on the southern bank of the Meta, reaching to the Amazons, and was discovered in 1541 by Gonzalo Ximenes Quesada.—(*d.*) *Llano of the Amazons*, or *the Marañon*, on both sides of the river, extending from the Andes to the mouth of the Marañon, over 2100 miles; it is also wooded, and rich in grass, entirely without stones, and inhabited by many species of animals. The inhabitants of these plains are called *Llaneros*. They are a hardy, vigorous race, proud of their descent from the first Spanish colonists, although their mode of life more resembles that of the Indians than that of their boasted ancestors. Farther to the south such plains are called *Pampas*, and in North America Savannahs.

LLERENA, a city, Spain, Estremadura, province, and 57 miles south-east of Badajos, situated in a beautiful and fruitful plain. It is well built, walled, flanked with towers, has numerous gates, wide streets, and, in the environs, some pleasant public walks; manufactures of linen and woollen fabrics, hats, leather, soap, white wax, brandy, wine, and oil. Pop. 6022.

LLORENTE, JUAN ANTONIO, a Spanish historian, was born in 1756, near Calahorra, in Arragon. He received his education at Tarragona, entered the clerical order in 1776, got a benefice at Calahorra, and in 1779 was consecrated a priest. He took his degree in canon law and was named advocate of the Council of Castile in 1781 and vicar-general of Calahorra in 1782. In 1789 he was made chief secretary to the inquisition. Here he had an opportunity to learn from the archives of the tribunal the history of its proceedings. In 1791 he was sent back to his parish on suspicion of being attached to the principles of the French revolution. In the meantime Don Manuel Abad la Sierra was made grand inquisitor, and, intending to reform the administration of this tribunal, employed Llorente to prepare a plan for the purpose. But before it was completed, the removal of Abad la Sierra was obtained by his enemies. Some time after, the design was taken up again at Madrid, and Llorente repaired thither to submit the plan which he had prepared in conjunction with the Bishop of Calahorra. Jovellanos, minister of justice, supported them. All depended upon their obtaining the assistance of Godoy the favourite of the queen. But Jovellanos was suddenly removed from office, and the inquisition remained as it was. Llorente was sentenced to a month's confinement in a monastery, and to pay a fine of fifty ducats, and was removed from the appointments which he held in the Holy Office. In 1808, when Napoleon undertook to regulate the affairs of Spain, Llorente, who saw in the intervention of the French the salvation of his country, repaired to Bayonne at Murat's request, and took part in organizing the new institutions of Spain, which, however, could not take permanent root as the clergy saw in them the destruction of their authority. When Joseph Bonaparte entered Madrid in 1809 he charged Llorente to take possession of the papers of the inquisition, and of the buildings and archives which were under the superintendence of the general commandant of the place. In 1812 Llorente published an historical memoir on the inquisition, with the view of freeing the Spanish nation from the charge of having ever been attached to this institution, and to the *autos de fé*. Llorente held several important offices under King Joseph, whom he followed to Paris on the restoration of Ferdinand. In 1817 he published his Historia critica de la Inquisicion de España, a work of considerable value, but written in too much of a partizan spirit. It was soon translated into most of the European languages, and drew upon him the resentment of the extreme Catholic party in France and Spain. The rage of his enemies was raised to the highest pitch by the publication of his Portraits Politiques des Papes, and the old man was ordered, in the middle of the winter of 1822, to leave Paris in three days, and France in the shortest possible time. He was not allowed to rest one day, and died exhausted a few days after his arrival in Madrid (Feb. 5, 1823). During his residence in France he published his Mémoires pour servir à l'Histoire de la Révolution d'Espagne, avec des Pièces justificatives, in 3 volumes (Paris, 1815)—a work of value, as illustrative of the events of 1808 in Spain. He also wrote a biographical account of himself (Noticia Biografica de Don J. A. Llorente, Paris, 1818), and Aforismos Politicos.

LLOYD'S. See INSURANCE.

LLOYD'S BONDS, instruments under the seal of a railway or other such company admitting the indebtedness of the company to a specified amount to the obligee, with a covenant to pay such amount with interest within a stated time. These companies have generally statutory authority to borrow only when a certain amount (usually the whole) of their capital has been subscribed and a specified portion paid up; their power of borrowing must also be exercised with the sanction of a general meeting. Such restrictions were severely felt by companies whose works were being constructed. A barrister, Mr. J. H. Lloyd, relieved the companies from this embarrassment, and to some extent evaded the Acts of Parliament connected with companies of this nature, by taking advantage of the fact that companies, though prevented in such cases from borrowing, could contract debts in any other way, and acknowledge their obligations in any form except that perhaps of a negotiable instrument. He introduced a form in which such acknowledgments would become almost as binding on the granters as a statutory debenture, and so become sufficiently marketable, though experience has shown that they are negotiable at a high rate of interest. A Lloyd's bond cannot be granted for money lent, even though the money has been actually employed to discharge debts for which bonds may have been

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granted, but can be granted for any other antecedent debt.

LO, St., a town of France, capital of the department of La Manche, on the right bank of the Vire, here crossed by a handsome bridge, 158 miles west by north of Paris. It consists of a number of streets diverging from a central height, and, with the exception of an elegant and well-planted square, is very irregularly and indifferently built. The principal edifices are the church of Notre Dame, with two lofty towers and finely painted windows; the church of Sainte-Croix, rebuilt in 1860; the ancient abbey of Sainte-Croix, now used as a horse-depôt; another church, now converted into a corn-market; a museum and a communal college. The staple manufacture, both of the town and neighbourhood, is drugget; and there is a considerable trade in cavalry horses and cattle. Pop. (1881), 10,121.

LOACH (*Cobitis*), a genus of fishes, forming a small group included in the family Cyprinidæ, or Carps. The loaches are nearly allied to the barbels; and generally resemble the carps in appearance. They possess elongated filaments or tentacles surrounding the mouth, and known as 'barbules;' these latter structures being supposed to subserve the sense of touch. (See Pl. CV.–CVI. fig. 18.)

LOADSTONE, a name given to the magnetic oxide of iron, whose chemical symbol is Fe_3O_4. It possesses magnetic properties, and communicates them to steel and iron. It is a hard reddish-black or gray mineral, and is found in various countries. See Magnetism.

LOAN, anything lent or given to another on condition of return or repayment. In law loans are considered to be of two kinds—*mutuum* and *commodate;* the former term being applied to the loan of such articles as are consumed in the use, as provisions, or given away as money; the latter to the loan of such articles which must be individually returned to the lender, which articles must therefore be of a nature capable of being used without destruction or alienation. In a loan for use the borrower has the right to use the article during the time and for the purpose agreed upon by the parties. He must take proper care of the thing borrowed, and restore it at the proper time in a proper condition. The lender must allow the borrower to use and enjoy the subject during the time of the loan according to the original intention, without molestation or impediment. He is bound to inform the borrower of the defects of the thing lent; if he do not, but conceal them, and an injury occurs to the borrower thereby, the lender is responsible. Where the thing has been lost by the borrower, and, after he has paid its value to the lender, is restored to the lender, the latter must return the money paid or the article lent. The acknowledgment of a loan of money may be made by giving a bond, a promissory note, or an I.O.U., the last of which requires no stamp. In England the contract of loan may be proved by parole, and frequently is proved by the lender's oath, supported by circumstantial evidence or letters of the borrower. In Scotland if the loan exceed £8, 6*s.* 8*d.*, it must be proved by some writing of the borrower, or putting him on his oath. No matter how many witnesses saw the money advanced, if the borrower deny upon oath having received it the lender has no remedy.

LOANDA, St. Paul de, a seaport town and island in South-western Africa, Angola. The town is of considerable extent, is a bishop's see, and the chief settlement of the Portuguese in this part of Africa. The better part of the town is built on an eminence, beneath which, along the sea-shore, are the hovels of the black population. The market is well supplied, especially with fruit and vegetables; bullocks and goats are also plentiful. The town is well fortified; the harbour is 3½ miles in length, deep and commodious. Principal exports, ivory and bees'-wax. Pop. 12,000.—The island, which is immediately opposite the town, and separated from the mainland by a narrow channel, is about 18 miles in length, north-east to south-west, and 2 miles in breadth. It contains seven or eight villages, and produces abundance of fruits, also goats and sheep.

LOANGO, a considerable maritime country in the south-west of Africa, stretching along the Atlantic from the equator south to the river Zaire or Congo. The hills are covered with luxuriant vegetation. The lakes and rivers abound with fish, and the forests with game. The climate is fine. Manioc, maize, and a species of pulse called msangen are cultivated. The finest fruits grow wild, and the sugar-cane attains an enormous size. Palm-trees are very numerous, and the potato and yam are abundant. The wild animals are chiefly tiger-cats, ounces, and hyænas. The hare and antelope are common, and the Chinese hog is used as a domestic animal; but neither horses, cows, sheep, nor asses thrive. The inhabitants are very superstitious, and practise circumcision. The country is governed by native chiefs. Loango, the chief town, is a collection of huts, about 4 miles in circuit, but does not contain a population exceeding 15,000.

LOAN SOCIETIES, institutions established for the purpose of advancing money on loan to the poorer classes, and receiving repayment by instalments with interest. The amount which these societies may advance to one person is £15, and no second loan can be made until the first is paid. The maximum rate of interest on sums advanced is fixed at 12 per cent per annum; the first instalment of repayment cannot be claimed sooner than the eleventh day after the advance. Loans are recoverable by the secretary or treasurer in the county courts. As in the case of friendly societies officers are appointed by the crown for the control and recognition of loan societies, and copies of the rules must be lodged with them. Each society must also keep a copy of its rules in a book open for inspection, and these rules are held binding upon every borrower. The property of the society must be vested in trustees for its use, who are empowered to maintain or defend actions and other proceedings in their own names on account of the body generally; and the treasurer and other officers of the society must give to the trustees security for the discharge of their duties. In the event of the death of a claimant intestate who is entitled to less than £50 his representatives are entitled to receive his claim within three months without the production of a will or letters of administration. An abstract of the accounts is to be made up yearly to the 31st December, and sent during January to the registrar to be laid before Parliament.

LÖBAU, a town, Saxony, in the circle of Bautzen, and 11 miles south-east of the town of that name, on the Saxon-Silesian Railway. It has a court of justice and several public offices, four churches, library, and bathing establishment; manufactures of leather, several woollen and linen mills and bleachfields, and a trade in yarn, corn, and cattle. Pop. 6651.

LOBELIA, a genus of plants giving its name to the natural order to which it belongs. The corolla is irregular, two-lipped, cleft longitudinally on the upper side; the anthers are united, the two lower ones bearded at the apex. The common species in Britain is *L. Dortmanna*, frequenting the lakes, more especially in mountainous districts. There are thirteen species in the United States and Canada, including the showy deep-red *L. cardinalis*, and the blue *L. syphilitica*, the latter growing near the spray of Niagara. The juice in all the species is more or less acrid and poisonous.

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LOBELIN. This is the name of an alkaloid obtained from *Lobelia inflata*, and is probably the active principle in the herb as used in medicine. In small doses the dried plant acts as a diaphoretic, but in larger doses it is powerfully emetic, and may even produce death. Besides the plant itself there are also in use the tincture, which is prepared by digesting the plant in spirit, and is used in difficulty of breathing; and the ethereal tincture, used as an antispasmodic. The alkaloid is got both from the seeds and from the plant, and is a yellow alkaline aromatic oil, with a strong tobacco-like taste. It is soluble in water, in alcohol, and in ether, and gives crystalline salts with the acids. It is distinguished by a number of characteristic reactions.

LOBOS, or SEAL ISLANDS, three islands in the Pacific Ocean, off the coast of Peru. The largest, called Lobos de Tierra, is 10 miles distant from the mainland, and is about 5 miles long, and 2 miles broad at the widest part. Thirty miles south from this island are the Lobos de Afuera, consisting of two islets, separated by a narrow channel. The largest of these two islands is about 2 miles long by ¾ mile broad. Large quantities of guano have been obtained from these islands.

LOBSTER. This well-known Crustacean has already been alluded to under the head of CRAWFISH (which see). It belongs to the highest order of the Crustacea, that of the Decapoda, distinguished by the possession of five pairs of walking legs; and is included in the tribe Macrura, or 'Long-tailed' Decapods, which are characterized by the elongated nature of the abdomen. The lobster family, or Astacidæ, includes the crawfish also; and the two genera of lobsters proper are represented by the *Homarus vulgaris*, or Common Lobster, and the *Nephrops Norvegicus*, or Norway Lobster; the Spiny Lobster (*Palinurus vulgaris*), also frequently used as an article of food, belonging to the separate family Palinuridæ, which includes some of the largest of crustacean forms. In the lobsters the appendage at the base of the outer antennæ or feelers is of smaller size, and the anterior pair of legs are always much larger than the others. The first, second, and third pairs of legs are provided with 'chelæ,' or nipping-claws, the fourth and fifth pairs simply terminating in single and pointed extremities. The inner edges of the large claws are provided with blunt tubercles, whilst the edges of the other claws have little serrations or teeth. The front of the head-shield bears a serrated, pointed projection —the 'rostrum.' The greater antennæ are very long and single, the shorter pair are bifid. The common lobster is of a bluish-black colour, variegated with pale or yellowish spots and patches; the remarkable chemical change which the colour undergoes on boiling being well known. The last joint or ring of the thorax is immovably joined to the preceding or penultimate segment in the common lobster, whilst in the Norway lobster the two last joints of the thorax are movable. The eyes of the common lobster are spherical; those of the Norway lobster are flattened. The old generic name of *Astacus*, which was uniformly applied to both lobsters and crawfishes, has now been supplanted by the newer generic names of *Homarus* and *Nephrops*, the term Astacus being retained to include the crawfishes alone. The common lobster is found all round the British coasts at moderate depths; the Norway lobster being found in deeper water, and although, as implied by the name, of northern distribution, it also occurs abundantly round the British coasts, and is brought from the Mediterranean Sea also. Its flesh is exceedingly delicate. It is generally of smaller size than the common lobster, and is coloured of a pale flesh tint, variegated with a light red or brown. Lobsters are fished by pots or 'creels,' generally of wood and net, or made of wickerwork. The bait is garbage of various kinds, but fresh fish, cuttle-fishes, &c., are frequently used to entice the lobsters to enter the traps. Very large quantities of lobsters are fished around the British and Continental coasts, for home and export use, and from America lobsters are now brought to Europe in immense quantities packed and preserved in hermetically sealed jars. From the north of Scotland alone from 6000 to 8000 lobsters are sent annually southwards, chiefly destined for the London market. The Norwegian fisheries also send immense quantities to Great Britain. Near Southampton a lobster-pond has been erected by a Mr. Scovell on the plan of the French fish-ponds, in which these crustaceans may be kept for weeks until required in the market, and welled vessels are generally employed in the fishery and conveyance of the lobsters, so as to insure their being brought alive to market. From mid-October to the end of April is the best season for lobsters, when they are in primest condition and most in demand. The lobsters change their shell or crust annually. The process of moulting has been studied by several naturalists, who inform us that the animals first retire into a dark or sheltered nook; the upper shell, or carapace, being generally the first part to separate. This sloughs off, and then the other parts of the body become uncovered; the moulting of the shell of the legs being the part of the process not so clearly understood. The skin remains soft for a short period, during which the deposition of lime and the formation of the new shell is taking place. Occasionally a piece of the old shell of the legs, which has not been wholly detached, may be seen incorporated with and adhering to the new shell; this accident causing the animal great inconvenience. The claws when lost, are reproduced in the lobsters and crabs, and the lobsters are said to suddenly lose their claws during thunder-storms, or at the sound of cannon. The increase of body in these and other Crustaceans takes place at the period of moulting; the hard outer shell preventing growth at other periods. They move freely about by walking, whilst by bending the tail sharply under the body, they propel themselves backwards in the water by aid of the broad tail-piece or fin with which they are provided. The lobsters are very prolific. The eggs are carried attached in large masses to the abdominal legs or *swimmerets* of the female. Upwards of 12,000 eggs have been counted borne under the abdomen or tail of the lobster, whilst others remained unprotruded from the oviducts. The eggs are deposited in the sand, where they are afterwards hatched. The common lobster appears to undergo little or no metamorphosis before attaining the perfect form. The Palinurus, or 'Spiny' Lobster, sometimes known as the 'sea-crayfish,' is so named from the numerous spines with which the body is covered. The body is coloured dark-red, with lighter patches, and sometimes attains a length of 3 feet and a weight of 15 lbs. The outer or larger antennæ are exceedingly long; the smaller pair being bifid at their extremities only. The front pair of legs are small, and rarely provided with nipping-claws. It inhabits deep water. (See Pl. LIV.–LV. fig. 15.) The same plate shows the Plated Lobster (*Galathæa strigosa*) of our coasts, which belongs to the Anomurous Crustacea, and therefore is not strictly a lobster.

LOBWORM (*Arenicola piscatorum*), a genus of Annelida or Worms, forming the type of the family *Arenicolidæ*, and recognized by its large rounded, obtuse head, which is unprovided with eyes or tentacles, and which bears a protrusible proboscis. The hinder part of the body is about the thickness of a common earthworm of large size, and the sides, in the middle portion of the body, bear each thirteen pairs of gill-tufts, by which respiration is carried on.

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The foot-processes and bristles are small and rudimentary in character, and are confined to the front portion of the animal. The lob- or lug-worm is the artificer of the little coils of sand, imitative of ropes, which are seen on every sea-beach after the receding tide. The worm comes up to the surface of the sand when the tide is at its height; but at the ebb it burrows its way downwards into the sand, and passes the excavated material through its body; the excreta thus assuming the form of a coiled-up cast of the interior of its alimentary tract. In the passage of the sand through the body any nutrient particles it may contain are extracted. These worms are of a dark green, or sometimes of an earthy colour, and are much used by deep-sea fishermen for bait. From this latter circumstance the specific name *piscatorum*—'of fishermen'—has been derived. They are included in the order *Errantia*, or 'Wandering-worms,' which forms the highest division of the great class of the Annelida.

LOCAL MARINE BOARDS are bodies established under acts 13 and 14 Vict. cap. xciii., and 17 and 18 Vict. cap. civ. s. 110, &c., at the ports of the United Kingdom which have a registered tonnage of at least 30,000 tons. These boards consist of the head of the municipality and the stipendiary magistrate at the place where the local board is established, or such of them as may be appointed by the Board of Trade, together with four members appointed by the same body from residenters, and six members elected by the shipowners belonging to the port. The principal duties of these boards are to provide for the examination of masters and mates in accordance with the rules laid down by the Board of Trade, and to establish shipping, or, as they are now called, mercantile marine offices, for the purpose of affording facilities for engaging seamen by keeping registers of their names and characters; superintending the engagement and discharge of seamen, and providing means for securing their presence on board at the proper times; facilitating the making of apprenticeships to the sea-service; and performing such other duties relating to merchant seamen and merchant ships as may be committed to them.

LOCATIVE CASE, in grammar, is the case expressive of locality. Such a case existed originally in all the Aryan languages; in Sanskrit all nouns and pronouns have a locative case in the three numbers singular, dual, and plural. In Latin only the names of towns had it; and in the later forms of that language the locative had the same form with the genitive in singular nouns of the first and second declensions, and with the ablative in third declension nouns and plurals.

LOCHES, a town, France, in the department of Indre-et-Loire, on the left bank of the Indre, 14 miles south-east of Tours. The opposite bank of the river is occupied by Beaulieu, with which a communication is maintained by a series of bridges. The town is poorly built, houses old, and streets narrow. It has manufactures of linen, coarse woollens, paper, and worsted; and a trade in wine, wood, and cattle. Pop. 4964.

LOCH KATRINE. See KATRINE (LOCH).

LOCH LEVEN. See LEVEN.

LOCH LOMOND. See LOMOND (LOCH).

LOCK, a well-known instrument used for fastening doors, chests, &c., generally opened by a key. The lock is reckoned the master-piece in smithery, a great deal of art and delicacy being required in contriving and varying the wards, springs, bolts, &c., and adjusting them to the places where they are to be used, and to the several occasions of using them. The principle on which all locks depend is the application of a lever to an interior bolt, by means of a communication from without; so that, by means of the latter, the lever acts upon the bolt, and moves it in such a manner as to secure the lid or door from being opened by any pull or push from without. The security of locks in general, therefore, depends on the number of impediments we can interpose betwixt the lever (the key) and the bolt which secures the door; and these impediments are well known by the name of *wards* (which slip into corresponding grooves of the key), the number and intricacy of which are supposed to distinguish a good lock from a bad one. If these wards, however, do not in an effectual manner preclude the access of all other instruments besides the proper key, it is still possible for a mechanic of equal skill with the lockmaker to open it without the key, and thus to elude the labour of the other. Another kind of impediment is the *tumbler*, which is a small projecting piece of metal carried on a latch, and which rests in a notch cut in the bolt, and can only be raised by application of the proper key. Various complicated and difficult locks have been constructed by Messrs. Bramah, Chubb, Hobbs, and others. In a very ingenious lock, invented by Mr. Perkins, twenty-four small blocks of metal, of different sizes, are introduced, corresponding to the letters of the alphabet. Out of these an indefinite number of combinations may be made. The person locking the door selects and places the blocks necessary to spell a particular word, known only to himself; the act of locking or throwing out the bolt produces the particular arrangements in the internal parts of the lock, and no other person, even if in possession of the key, can open the door without a knowledge of the same word. See BRAMAH SAFETY-LOCK, CHUBB-LOCK.

LOCK (of fire-arms). See MUSKET, REVOLVER, RIFLE, &c.

LOCK, in inland navigation. When a canal varies from one level to another of different elevation, the place where the change of level takes place is commanded by a lock. Locks are tight, oblong inclosures, in the bed of the canal, furnished with flood-gates at each end, which separate the higher from the lower parts of the canal. When a boat passes up the canal the lower gates are opened, and the boat glides into the lock, after which the lower gates are shut. A sluice, communicating with the upper part of the canal, is then opened, and the lock rapidly fills with water, elevating the boat on its surface. When the lock is filled to the highest water level the upper gates are opened, and the boat, being now on the level of the upper part of the canal, passes on its way. The reverse of this process is performed when the boat is descending the canal. Locks are made of stone or brick, sometimes of wood. The gates are commonly double, resembling folding-doors. They meet each other, in most instances, at an obtuse angle, and the pressure of the water serves to keep them firmly in contact. Cast-iron gates are sometimes used in England, curved in the form of a horizontal arch, with their convex side opposed to the water.

LOCKE, JOHN, one of the most eminent philosophers and valuable writers of his age and country, was born at Wrington, in Somersetshire, August 29, 1632. His father, who had been bred to the law, acted in the capacity of steward to Colonel Alexander Popham, by whose interest, on the breaking out of the civil war, he became a captain in the service of Parliament. John Locke was sent to Westminster School, whence he was elected, in 1651, to Christ Church College, Oxford. Here he distinguished himself much by his application and proficiency; and having taken the degree of B.A. in 1655, and of M.A. in 1658, he applied himself to the study of physic. In the year 1664 he accepted an offer to go abroad in the capacity of secretary to Sir William Swan, envoy from

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Charles II. to the Elector of Brandenburg and other German princes; but he returned in the course of a year, and resumed his studies with renewed ardour. In 1666 he was introduced to Lord Ashley, afterwards Earl of Shaftesbury, who formed so high an opinion of his general powers that he prevailed upon him to take up his residence in his house, and urged him to apply his studies to politics and philosophy. By his acquaintance with this nobleman Locke was introduced to the Duke of Buckingham, the Earl of Halifax, and others of the most eminent persons of their day. In 1668, at the request of the Earl and Countess of Northumberland, he accompanied them in a tour to France, and on his return was employed by Lord Ashley, then chancellor of the exchequer, in drawing up the Fundamental Constitutions of Carolina. He also superintended the education of that nobleman's son. In 1670 he began to form the plan of his Essay on the Human Understanding, and about the same time was made a fellow of the Royal Society. In 1672 Lord Ashley, having been created Earl of Shaftesbury, and chancellor, appointed Locke secretary of presentations, which office, however, he lost the following year, when the earl was obliged to resign the seals. Being still president of the Board of Trade, that nobleman then made Locke secretary to the same; but the commission being dissolved in 1674, he lost that appointment also. In the following year he graduated as a Bachelor of Physic, and being apprehensive of consumption, travelled into France, and resided some time at Montpellier. In 1679 he returned to England at the request of the Earl of Shaftesbury, then again restored to power; and in 1682, when that nobleman was obliged to retire to Holland, he accompanied him in his exile. On the death of his patron in that country, aware how much he was disliked by the predominant arbitrary faction at home, he chose to remain abroad; and was in consequence accused of being the author of certain tracts against the British government; and although these were afterwards discovered to be the work of another person, he was arbitrarily ejected from his studentship of Christ Church by the king's command. Thus assailed, he continued abroad, nobly refusing to accept a pardon, which the celebrated William Penn undertook to procure for him. In 1685, when Monmouth undertook his ill-concerted enterprise, the English envoy at the Hague demanded that Locke should be delivered up, which demand obliged him to conceal himself for nearly a year; but in 1686 he again appeared in public, and formed a literary society at Amsterdam, in conjunction with Limborch, Leclerc, and others. During the time of his concealment he also wrote his first Letter concerning Toleration, which was printed at Gouda in 1689, under the title of Epistola de Tolerantia, and was rapidly translated into Dutch, French, and English. At the Revolution he returned to England in the fleet which conveyed the Princess of Orange, and being deemed a sufferer for the principles on which it was established, he was made a commissioner of appeals, and was soon after gratified by the establishment of toleration by law. In 1690 he published his celebrated Essay concerning Human Understanding, which he had written in Holland. It was instantly attacked by various writers. It was even proposed at a meeting of the heads of houses of the University of Oxford to formally censure and discourage it; yet nothing was finally resolved upon, but that each master should endeavour to prevent its being read in his college. Neither this, however, nor any other opposition availed; the reputation, both of the work and of the author, increased throughout Europe; and besides being translated into French and Latin, it had reached a fourth English edition in 1700. In 1690 Locke published his second Letter on Toleration; and in the same year appeared his two Treatises on Government, in opposition to the principles of Sir Robert Filmer and of the whole divine right of kings or passive-obedience school. He next wrote a pamphlet entitled Some Considerations of the Consequences of lowering the Interest and Value of Money (1691, 8vo), which was followed by other smaller pieces on the same subject. In 1692 he published a third Letter on Toleration, and the following year his Thoughts concerning Education. In 1695 he was made a commissioner of trade and plantations, and in the same year published his Reasonableness of Christianity, as delivered in the Scriptures; which being warmly attacked by Dr. Edwards in his Socinianism Unmasked, Locke followed with a first and second Vindication, in which he defended himself in a masterly manner. The use made by Toland and other latitudinarian writers of the premises laid down in the Essay on the Human Understanding at length produced an opponent in the celebrated Bishop Stillingfleet, who, in his Defence of the Doctrine of the Trinity, censured some passages in Locke's essay, and a controversy arose, which was only closed by the bishop's death. With his publications in this controversy, which were distinguished by mildness and urbanity, Locke retired from the press, and his asthmatic complaint increasing, he resigned his post of commissioner of trade and plantations, observing that he could not in conscience hold a situation to which a considerable salary was attached without performing the duties of it. From this time he lived wholly in retirement, under the roof of his friend Sir F. Masham, at Oates, in Essex, much engaged in scriptural studies. He continued nearly two years in a declining state, and at length expired October 28, 1704.

The moral, social, and political character of this eminent man is sufficiently illustrated by the foregoing brief account of his life and labours, and the effect of his writings upon the opinions and even fortunes of mankind is the best eulogium on his mental superiority. In the opinion of Dr. Reid he gave the first example in the English language of writing on abstract subjects with simplicity and perspicuity. No author has more successfully pointed out the danger of ambiguous words, and of having indistinct notions on subjects of judgment and reasoning; while his observations on the various powers of the human understanding, and on the extent and limits of human knowledge, are drawn from an attentive reflection on the operations of his own mind. In order to study the human soul he went neither to ancient nor to modern philosophers for advice, but, like Malebranche, he turned within himself, and after having long contemplated his own mind, he gave his reflections to the world. Locke's great work, his Essay on the Human Understanding, which he was nineteen years in preparing, owes its existence to a dispute at which he was present, and which he perceived to rest on a verbal misunderstanding, and considering this to be a common source of error, he was led to study the origin of ideas, &c. In the first book he disposes of the Cartesian doctrine of innate principles or axioms, which would conflict with his theory of the empirical origin of our ideas. In the second book this theory is fully developed. He argues that our natural faculties are capable of forming every notion that we possess, that the action of these faculties arises from experience, and that the mind may therefore be compared to a sheet of white paper void of all characters until the events of life inscribe them. The principle that all the materials of our knowledge come from experience he further explains by making a distinction between sensation and reflection as sources of ideas

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The former is observation of the outer world, the latter of our own mental operations. The ideas of reflection are inferior in distinctness to those furnished to the mind through the sensuous impressions of outward objects. Without consciousness it is impossible to have an idea, for to have an idea and to be conscious of it is the same thing. He tries, in long and acute processes of reasoning, to bring the ideas of space, time, infinity, causality, identity and diversity, substance, and good and evil, within the limits of experience. Good and evil, he holds, are nothing but that which produces pleasure or pain; and moral good and evil are the conformity of human actions to some law whereby physical good or evil is produced by the will and power of the law-maker. The third book treats of the nature, use, and abuse of language. In the fourth book he passes from ideas to knowledge, treating the question as to the adequacy of our ideas and the reality of our knowledge. He maintained that the mind does not know, think immediately, but only by the intervention of ideas; that knowledge is real only in so far as there is conformity between our ideas and the reality of things; and that ideas may be entirely inadequate and yet distinct. This theory contains the germ of scepticism, and was the ground on which Berkeley denied the existence of the material world, and Hume involved all human knowledge in doubt. There are, however, indications in several passages of his work that Locke was not satisfied with that tendency to sensationalism, which, when logically carried out, led to utilitarianism in morals, materialism in metaphysics, and scepticism in religion. His next great work, his two Treatises on Government, was opposed by the theorists of divine right and passive obedience, and by writers of Jacobitical tendencies; but it upholds the great principles which may be deemed the constitutional doctrine of his country. His Reasonableness of Christianity maintains that there is nothing contained in revealed religion inconsistent with reason, and that the main point is to believe that Jesus is the Messiah. Among his works that were published after his death were Paraphrase and Notes upon St. Paul's Epistles to the Galatians, Corinthians, Romans, and Ephesians, with an Essay prefixed for the Understanding of St. Paul's Epistles by a reference to St. Paul himself; and a Treatise on the Conduct of the Understanding. His works have been collected together, and frequently printed in three vols. folio, four vols. quarto, and more lately in ten vols. 8vo, with a Life prefixed by Law, bishop of Carlisle. Some valuable documents were published by Earl Lovelace in his Life and Correspondence of John Locke (London, 1829).

LOCKHART, JOHN GIBSON, a talented and versatile author, for many years editor of the Quarterly Review, was second son of Dr. Lockhart, one of the ministers of Glasgow. He was born in 1794, and consequently in 1809, when as a student at the Glasgow University he gained an exhibition to Baliol College, Oxford, he had only completed his fifteenth year. After leaving Oxford he made a short tour on the Continent. On his return he became a member of the Scottish bar. He cannot be said, however, to have ever practised as an advocate, but from the first devoted his time to literary pursuits. One of his first employments was the compilation of the historical portion of the Edinburgh Annual Register. This was followed by the establishment in 1817, in concert with Professor Wilson, of Blackwood's Magazine, a Tory organ, which at the outset created an immense sensation by the ability and keen satire of many of its articles. In 1820 Lockhart, who had previously become a favourite with Sir Walter Scott, married his eldest daughter, and thus became so intimately associated with that great man that much of his future life took its colour from the connection. In 1826 he succeeded Mr. Gifford as editor of the Quarterly Review, and continued to maintain its high character unimpaired till 1853, when declining health induced him to retire. Many of Lockhart's productions, having served the special purposes for which they were written, are already forgotten, but a more enduring remembrance is due to his Spanish Ballads, originally contributed to Blackwood; his novels of Valerius, Reginald Dalton, and Adam Blair; and above all, his Life of Sir Walter Scott, which, though indebted for much of its interest to its subject, is on the whole written, notwithstanding occasional prolixity and one or two worse blemishes, with great taste and judgment. Mr. Lockhart, for his steady attachment and important services to the Conservative party, was rewarded in 1843, by Sir Robert Peel, with the appointment of auditor of the Duchy of Lancaster. He died at Abbotsford on the 25th of November, 1854, and was buried in Dryburgh Abbey, close by Sir Walter Scott.

LOCLE. See CHAUX-DE-FONDS.

LOCOMOTION, ANIMAL. The subject of flying has already been treated of and explained in the article upon that subject. It remains, however, to glance at the other modes of animal locomotion, such as swimming and walking, and also to briefly note the relations of these modes of progression. In *swimming* we have locomotion in a denser medium than the air; and we here find a mode of progression in which it is necessary to think of the intimate relations existing between the size, weight, and shape of the animal and the medium in which it lives, and through which it moves. The conditions in virtue of which an animal will swim well through the water are those in which it presents large surfaces to the medium, and where it is a little heavier than the water. The movements of such surfaces tend to give the greatest power of resistance in one way, and the least disadvantageous displacement in the other. Sir Isaac Newton showed that animals moving in water, and in the air also, meet with a certain resistance which arises from, and is increased or modified by, the density or nature of the medium, and by the shape, rate of speed, and area or superficies of the animal moving in it. Various means and modes of moving in water are found throughout the animal world. In some forms, as in the Medusæ or jelly-fishes, we find motion effected by the contraction and dilatation of the bell-shaped body. The Pteropods, or minute molluscs, found in immense quantities in the Arctic seas, swim by means of the two wing-like appendages springing from the sides of the neck, and which thus act like a double paddle. Whilst in the fishes we see at once the most common mode of aquatic progression, to which we are accustomed to give the name of swimming. When an ordinary fish swims, the chief action by means of which it progresses is that of the tail-movements. The explanation generally given of those movements is, that they are made from side to side, or on either side of a line or axis which is taken as that of the fish when straight and at rest. The action or movements, according to this view—that of Borelli (De Motu Animalium, Romæ, 1680)—have been compared to the oscillations of a rudder from side to side made by moving the tiller. And the movements of the tail in this way exemplified the mechanical proposition known as the 'parallelogram of forces;' the lateral movements of the tail, when made with a certain and sufficient velocity, causing the forward propulsion of the fish in the straight line or axis. Pettigrew disputes the correctness of the views of Borelli, which have been generally accepted since the time of the latter. Pet-

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tigrew, as a matter of observation, says, that when the fish curves its body by a sudden movement of the tail it describes a curve in the water corresponding to that of the body. If the concavity of the curve of the body is to the right side, the fish will swim in a curve to that side. And the result of this observation has been to convince Dr. Pettigrew that fishes in swimming throw their bodies into a double or figure of 8 curve, and not into a single curve as described by Borelli, and as generally believed. The only time when the body of the fish in locomotion presents a *single* curve is when it is turning. The two curves Pettigrew terms the *cephalic* or head-curve, and the *caudal* or tail-curve; and where, as in the eels, more than two curves occur, they are always in pairs and are complementary. These curves act as points of resistance or *points d'appui* for each other. Thus the cephalic curve and the water inclosed by it serves as a fixed point for the caudal curve, and *vice versa*. The analogy between motion in the air, or flying, and motion in the water, or swimming, is apparent when we consider that the water and air are influenced by curves from the tail of the fish and wing of the bird respectively. And the opposite and complementary curves, in which tail and wing move, constitute screws, which tend to force forward the bodies of the animals with the necessary motion adapted to the respective media. The fish thus, in reality, describes a waved track in swimming; and it may further be said to cleave or drill the water in two directions—from behind forwards, by the twisting of the body on its long axis; and laterally, by the front and hinder portions of the body assuming opposite curves. The pectoral or breast-fins of fishes also appear to move in curves; and the correspondence in motion between the wing of the bird, insect, or bat, and the breast-fin of the fish, thus becomes apparent. The action of the pectoral fins is chiefly devoted to supplementing the action of the tail in urging the fish forward, or to aid the fish in turning. But the action of the pectoral fins may be reversed, and the animal (for example the stickleback) may thus propel itself tail first through the water. The movements of the whale, porpoise, sea-cow, &c., correspond to those of fishes; the tail, however, in these forms being placed horizontally, or across the body, and not vertically as in fishes; and, as a consequence, the tail acts from above downwards, and not from side to side. The pectoral limbs of the whale, &c., corresponding to the breast-fins of fishes, are chiefly used in turning. The skates and rays, however, exemplify fishes in which the breast-fins, enormously enlarged when compared with other fishes, act as the chief agents in progression, and are used after the fashion of wings, with a spiral motion. The beaver, as exemplifying an aquatic mammal, uses the tail, which is flattened from above downwards, in the same manner as that of the fish, namely, to strike the water from side to side. And in aquatic birds, the tail, similar in conformation to that of the beaver, may be twisted in an oblique manner so as to fit it for directing the swimming movements of the animal. In the swimming of the seals, walruses, and sea-bears, differences are observable from the mode of fish-progression. In drawing up and flexing the hinder part of the body, in order to prepare for the effective movement of extension, the otherwise expanded feet are drawn together so as to present the least possible surface of resistance to the water; but in the movement of extension, when the great forward effort is made, the feet are opened or expanded to their utmost extent, and thus present the greatest surface for the propulsive effort. The analogy between the opening and closing of the bird's wing-feathers in flight, and the opening and closing of the seal's feet is readily traceable. The front extremities of the seal are used chiefly in balancing the animal in the water, or in enabling it to turn and change its position. In the sea-bear (*Otaria jubata*) the anterior members, on the contrary, take the place of the hinder-limbs of the seal, and by their aid the animal chiefly progresses. The hinder-limbs act chiefly as rudders to guide or alter the course. The walruses exemplify a stage intermediate to the seal and sea-bear, in that the front members are used like those of the sea-bears, whilst the hinder members are employed like those of the seals. In the aquatic progression of turtles, both pairs of limbs are used in progression; the right front limb and the left hinder extremity moving together, this kind of motion resembling walking. In crocodiles, newts, and in the proteus and axolotl, the comparatively feeble limbs are used when in the water in a manner similar to that in which the legs of the turtle are used. Some birds possess the power of flying below the water. In the guillemots the wings alone act under water; in the grebes both wings and feet act as agents in sub-aqueous propulsion. The wing is converted into an efficient swimming organ by being extended and flexed backwards; the feathers being directed downwards in this way, and giving to the back part of the wing the necessary obliquity for the forward propulsion of the bird. In the penguin and great auk the rudimentary wings, incapable of exercising the power of flight, are twisted round so that the concave surface may be directed backwards, and so take the most effective hold of the water. The differences between flight below and flight above the water may be stated as follows: In flight proper the effective stroke is given downwards and forwards by the under or concave wing-surface which looks in this direction; the less powerful stroke being given in an upward and forward direction by the upper and convex wing-surface. In diving the most effective stroke is downwards and backwards; the less effective being similarly upwards and forwards. The long axis of the bird's body in true flight and the short axis of the wings, are inclined upwards, and make with the horizon a forward angle. In diving, the long axis of the body and the short axis of the wings are inclined downwards, and make a backward angle with the water's surface. The necessity for the downwards and backwards stroke in diving is apparent, when we consider that the bird is lighter than the water, and must propel or force itself into that medium, 'to prevent its being buoyed up to the surface.' As stated in the article on FLYING, weight is necessary to aerial flight. So also is *levity* for diving; the lightness of the bird which dives, preventing the travelling forces and surfaces of the bird from carrying it to the bottom, without the possibility of its rising again to the surface of the water. Weight in aerial flight regulates the height and side or horizontal movements of the bird; the stoppage of the movements of the wings and the mere weight of the body bringing the bird to the ground. Similarly in diving, the levity of the bird's body, together with the slowing or cessation of the movements of wings and feet, brings the bird to the surface. In swimming the feet of birds make definite curves in opposite directions, the right foot being sent out from within outwards, the left from without inwards. The right foot similarly comes from above downwards during extension; the left from below upwards when flexed. In the curious foot of the grebe (*Podiceps*), the heavy membrane with which each of the three separate toes is provided closes or contracts when the foot is being retracted towards the body during the least effective stroke, and expanded when the limb is forced from the body to make the effective and propulsive stroke. The greatly

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expanded pectoral fins of the flying fishes proper, and of the flying-gurnards, act apparently as true wings in their movements in a limited sense, and not as mere parachutes to break the fall of the animal into the sea, as some observers have maintained. In flight these fins are raised, inclined forwards and outwards, expanded from the sides of, and form a certain angle with the body. An angle of 30° with the horizon is stated to be the angle made by the fins of the flying-fish when raised, and this angle is about the greatest made in the down-stroke of the wings in birds and insects. A preliminary rush through the water gives the flying-fish an *initial velocity*, this velocity carrying on the fish through the air, when it is supported for a short period by the kite-like action of the expanded fins. The fins meet the air from beneath in this case; and the fins have no downward motion whatever. But the fins are in a limited sense pinions, in that by their extended position they utilize the velocity acquired in the water and transferred to the air, in keeping the fish above water by their being raised and expanded as described. That the fins are not mere passive agents, or mere parachutes, is proved by the fact that these creatures can sustain themselves in the air for a distance sometimes exceeding 200 yards, at a height of over 20 feet above the surface of the sea. These fishes also appear to be capable of changing their course when in the air; and from this important observation alone we may safely assume that the fins are active agents in some degree. It might of course be questioned whether or not the tail had any power in effecting the latter action.

In the swimming of man we necessarily deal with a semi-artificial mode of progression, but one at the same time which becomes subservient to, and is regulated by, the ordinary laws of aquatic locomotion, both in their relation to the medium, to the being immersed therein, and to the forces employed in his propulsion. The human frame is lighter than water, and the movements of the limbs vary in effect according to their direction, just as in the case of the movements of lower forms. Thus when the limbs move horizontally and downwards, they support and propel the body. When moved in an upward direction (for example in diving) the body tends to descend. The direction of the surfaces of immersion, in short, either tends to float or submerge the body. The flat (dorsal or ventral) position is assumed by man when he wishes to float in water, and he thus resembles the natural position of all lower swimming forms. Movements can be effected by all four extremities, by two extremities alone, or by one of the upper and one of the lower extremities together. In ordinary swimming, where all four limbs are employed, the extremities are flexed and extended at the same time. The hands and feet describe each an ellipse, the moving parts being thus thrown over a comparatively wide area. When the arms are pushed away from the sides of the body they describe the inner sides of their ellipses; and when the legs are pushed from the body they describe the outer sides of their ellipses. In being drawn towards the body the arms describe the outer, and the legs the inner sides of their respective ellipses. In progression, the ellipses become looped, and in high rates of speed wavy lines result to mark the course. In the extension of the arms, the palms and inner aspects of the arms are directed downwards, and thus tend to float the body anteriorly. At the end of extension the hands turn slightly round, the palms being directed outwards and backwards. When the arms are flexed, the palm is directed downwards; whilst at the termination of the movement of flexion, the hands, being depressed, force the body upwards, as is well seen at the end of the stroke in swimming. So long as the arms and legs move in any direction they propel the body. The straight position of the legs in extension assists their efficiency in forcing the body forward; and in extension they are besides moved more quickly and forcibly than in flexion. The inner surfaces of the legs and thighs tend to buoy the body posteriorly. The newer or *overhand* mode of swimming has the advantage over the old method—where the limbs were simultaneously pushed from and drawn towards the body—in that by moving the arm and leg of one side only at one time, the body is thrown more or less on its side, and the resistance offered by the flat surface of the body in the former method is thus greatly diminished. The arms and legs in overhand swimming—now very generally practised—work in an almost vertical, instead of the former horizontal plane. In true *side-swimming* the body is turned upon the side. The left arm is first advanced, then the right arm and legs are brought into play by making a powerful back-stroke. These latter members are next advanced, the left arm acting as a cut-water, and moving by itself alternately with the right arm and the legs. The left arm further invariably moves in an opposite direction to the other limbs, that is, supposing the individual swims on his left side. The right arm forms the odd member if he swims on the right side.

Locomotion on land, or walking, may be quadripedal or bipedal—taking man's case as the typical form of the bipedal mode of progression. The bones of the limbs of man form no very acute angles, as in animals which attain high rates of speed. He has consequently less power of elongating and of shortening his limbs, and, as a result, of moving, except at a very moderate pace. The erect position of man is further maintained by muscles which in lower forms are devoted to locomotion, and the bones of the legs are situated and arranged in a spiral line nearly vertical in position and nature. Here also the acute nature of the angles of the limb bones is seen to be diminished. The weight of the erect body is ultimately transmitted to the foot through a series of curves; and the consideration of the foot shows how beautifully adapted it is to receive and sustain the weight thus thrown upon it. The double arch of the foot thus forms a perfect support for the body. The common support of this double arch is the back part of the *calcaneum* or heel-bone, and the chief or inner arch is composed of the three inner toes which rest upon the *astragalus* or bone with which the leg articulates. The head of the astragalus is secured by a strong ligament (the *inferior calcaneo-scaphoid ligament*), which has frequently the entire weight of the body to bear. The outer arch consists of part of the instep and two outer toes; the chief support of this latter arch being the *plantar* or *calcaneo-cuboid* ligaments. This double-arched structure, as above viewed, may also be noticed from another aspect, the human foot being arched from behind forwards, from the heel towards the toes, and also across the foot, or from side to side. The elasticity and firmness of the step is thus insured, whilst the requisite degree of mobility is also thus attained. The pressure of the body when the heel is raised is transmitted to the toes and front portion of the foot; the toes thus spreading out to sustain the weight. This spreading of the toes is well seen in children; and in this particular movement the adaptation of the foot—moving in a forward direction from behind—is also well seen; this spreading of the toes seizing hold of the ground, whilst the body is urged forward by the leverage thus exerted. The upper extremities of man are not directly or necessarily of use in walking, although they may be employed in locomotion, mediately, to hold supports,

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Man with a stick in each hand, as has been well observed, becomes a quadruped in his locomotion. The arms oscillate along with the legs, the movements of the left arm thus corresponding with those of the right leg, and *vice versa*. Three joints are concerned in man's walking. The hip is a ball-and-socket joint, whilst the knee exemplifies a perfect, and the ankle a less perfect hinge-joint. In the erect position the hip-joint permits the limb to be moved forwards only; the knee-joint allows a backward movement; and the ankle-joint may be regarded as possessing little or no movement in this position. When beginning to walk from the erect position with both feet on the ground, the body is inclined in front so as to throw the centre of gravity forwards. The right foot—supposing the act to begin with this foot—is raised by the muscles of the calf, advanced the length of a step, and the foot is then brought to rest on the ground. The left leg is now brought forward to support the right, and so to keep the body from falling; the left leg being brought forward partly mechanically or by a pendulum-like movement, and partly by the action of the muscles on the front of the thigh, by the hamstring muscles, and by those on the front of the leg. When the left leg is thus brought forward, and the left foot has touched the ground, the muscles of the *right* calf tend to throw the weight of the body still more on the left leg, and so the body is thrown more forwards. The time for the right leg to swing forwards now arrives, the right foot being placed on the ground to prevent the body from falling, and at the same time another step forward is taken. Thus the greatest ease in walking depends upon the hinder and swinging leg being brought forward for each new step with the least possible exertion; and only in this latter case is walking performed with the proper saving of force. The advantage gained by the pendulum-motion thus described is very great, and depends chiefly on the saving of muscular effort. The initial movement in walking is the swinging forward of the body, and the trunk fully participates in the movements of locomotion. It is swaying regularly in walking from one side to the other, accordingly as the centre of gravity is thrown over one leg or the other. Different individuals appear to effect this change of body-position, relatively to the legs in walking, in different ways. Sometimes it is done by a slight rotatory movement of the pelvis upon the head of each thigh-bone alternately. When the left heel is raised and the body pushed forwards and upwards, the pelvis slightly moves upon the head of the right thigh-bone so as to bring the weight over the line of support afforded by the left leg, whilst the right leg is being thrown forwards. This rotatory movement is immensely exaggerated in some persons, and becomes a regular 'roll' from side to side—a mode of locomotion by no means graceful, and to which, probably from the conformation of the broader pelvis, women are more inclined than males. In walking both feet are never off the ground at the same time; but in *running* each leg makes a series of jumps in rapid succession, and both feet leave the ground at one moment of their action. The legs are advanced by muscular action in running, and the angle between the leg and foot is acute. The toes are brought first to the ground in running, and the chief propulsive action is given by the forcible and *simultaneous* extension of the knee and hip-joints of each limb. In running the body is more inclined forwards than in walking, and the arms are generally held close to the sides, as in professional runners and as seen in the wings of the ostrich, to prevent the great oscillation at the shoulders which would otherwise be caused by the forcible movements of the pelvis. In *leaping* the joints are flexed for the leap, and the sudden extension gives the impetus to the act; only in leaping both legs are extended simultaneously, whilst in running they are extended alternately. The length of the leg chiefly determines the number of steps taken in a given time; this corresponding to the well-known law of the pendulum. Each person has therefore a natural step, or rather a natural measure or length of step, which he cannot exceed except by an effort. In quick walking the period at which both legs touch the ground is less than in slow movement, and disappears when the rate attains its maximum. The step in quick running increases greatly, the duration slowly diminishing; in slow running the length diminishes, and the duration or time of each step remains nearly the same. In quick running the *time* of a step to that in quick walking is estimated as standing in the proportion of two to three, the *length* of the steps being as two to one. A person can thus run in a given time three times as fast as he can walk. In most quadrupeds, as opposed to man, and specially in those which can run at high rates of speed, the angles formed by the bones of the limbs are more or less acute. In walking various quadrupeds move their legs in widely different order. In the horse in walking, supposing the near or left fore-foot to be just lifted, the right hind-foot is next put down, then the right fore-foot, and lastly the left hind-foot. In slow walking the horse has three feet in constant movement on the ground; and the fore and hind limb of opposite sides are unplanted and used in diagonal positions, as indicated in the above order. In the giraffe the legs of opposite sides act together, but alternately, this animal presenting an exception to the general rule. Most quadrupeds, like the horse, move the legs diagonally.

The movements of flying, walking and swimming would appear on close consideration to be correlated in the most intimate manner. From the researches of Dr. Pettigrew, Marey, and others, the figure-of-8 motion has been regarded as typical of the movements of almost all creatures in flight, swimming, and walking; and the form of the *screw* is considered as that which most nearly indicates the mechanical structure and conformation of the wing, paddle, and other locomotive appendages. The entire subject is highly complicated, and involves considerations not only of a physiological but also of a mathematical and physical character. And besides the difficulty of investigating rapid movements in living forms, there appear to exist certain difficult moot points, upon which the mathematical or physical evidence, and that of the physiologist appear to be at variance. But apart from the more complex questions, the subject is one of much interest, and which, in its more elementary aspects—such as have been noticed in the present article—is capable of full appreciation by the intelligent non-technical reader. See Animal Locomotion, by J. Bell Pettigrew, M.D.; and Animal Mechanism, by Professor E. J. Marey.

LOCOMOTIVE ENGINE, a steam-engine placed on wheels, and employed to move loaded carriages and waggons on a railway. It is so called in contradistinction to a stationary engine. This variety of the steam-engine, which has advanced to such a wonderful degree of perfection, employs the agency of steam in the simplest form in which it is capable of producing power, namely, by the mere excess of its pressure above that of the atmosphere. The reason why the more economical process of condensation is inapplicable in this case is obviously the increase of weight and complexity attending the use of that process, both of which should be avoided as much as possible in a machine which propels its own weight at an immense velocity over artificial works composed of yielding materials, all more or less liable to wear and tear from the effects of momentum and friction.

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The qualifications for a perfect locomotive are not easily reconcilable with each other, and demand the utmost skill, combined with long experience, on the part of the manufacturer.

We have said that lightness and simplicity of parts are desirable; but these, on the other hand, must not interfere with the safety and the economical working of the engine. Its stability must be insured by the position of the wheels and the centre of gravity; and every available means must be adopted for increasing, first, the evaporative power of the boiler, and secondly, the mechanical effect of the steam, without unduly increasing the weight and cost of the apparatus. It is evident that any increase in the economical working of the locomotive effects a two-fold saving, namely, in the cost of the fuel and in the weight to be carried. Hence the steam is worked at a very high pressure (from 80 to 150 lbs. above the atmosphere), and is cut off and expanded in the cylinder.

It is well understood that railways owe their origin to the necessities of the trade in coal, and that the introduction and improvement of the locomotive followed gradually upon the improvements that had been made in the road on which they were constructed to run. The principle of steam-locomotion, on common roads at least, was conceived and discussed more than two centuries ago; but the first locomotive-carriage actually constructed was made by N. J. Cugnot, a Frenchman, in 1769: and a larger engine on the same plan was made by him in 1771, and is still preserved in the Conservatoire des Arts et Métiers at Paris. The motive power was derived from two single-acting cylinders placed upon a boiler, and having each a steam-tight piston moved alternately by steam admitted through a four-way cock. The engine was designed on a working scale; it had a good-sized copper boiler, a pair of cylinders 13 inches in diameter, and a driving-wheel 4 feet 2 inches in diameter and 7 inches broad at the tread. The engine, it appears, was only tried two or three times, for, having accidentally overturned in the neighbourhood now signalized by the Madelaine, it was immediately locked up in the arsenal.

In 1784 William Murdoch, Watt's assistant, constructed a tiny locomotive, with an upright cylinder ¾ inch in diameter, with a stroke of 2 inches; the piston-rod was connected to one end of a beam which vibrated on a fulcrum at the other end, like the 'grasshopper' engine. The wheels were 9 inches in diameter, and were turned by a connecting-rod from the beam. The cylinder was half immersed in a copper boiler, through which a flue passed obliquely, the heat being supplied by a spirit-lamp beneath.

Richard Trevithick constructed and worked the first tramway locomotive, which was patented in 1802, and constructed in 1804 to run on the Merthyr-Tydvil Railway. It had a single cylinder 8 inches in diameter, with a stroke of 4 feet 6 inches. The boiler was cylindrical, with flat ends. The furnace and flue were inside the boiler, the latter recurving and leaving the boiler at the fire-door end. The engine drew 10 tons of bar iron, besides the waggons, at 5 miles per hour, for a distance of 9 miles, carrying with it sufficient water and fuel for the trip. The variable nature of the adhesion between the driving-wheels and the rails led to the frequent slipping of the wheels, and in order to obviate this objection Mr. Blenkinsop in 1811 employed a rack-rail, in which a large toothed wheel was to work. In the year following Messrs. Chapman brought forward a steam-carriage, in which the weight was distributed over a larger surface, and consequently less injury done to the rail. About the same time Mr. Brunton of Butterley contrived a carriage to be propelled by levers, acting like horses' feet. A railway locomotive, constructed by Mr. George Stephenson in July, 1814, for the Killingworth Railway, was reckoned the most perfect for many years. That gentleman employed two cylinders, and increased the efficacy of the machine by distributing the friction over four wheels instead of over two, as in Trevithick's machine. In 1829 locomotives of a still better construction were started upon the Liverpool and Manchester Railway. The locomotives tried were the *Sanspareil*, by Mr. Hackworth; the *Novelty*, by Messrs. Braithwaite and Ericson; and the *Rocket*, by Mr. Stephenson. After a fair trial the *Rocket* obtained the reward. This engine weighed 4 tons 5 cwts.; the tender following it weighed 3 tons 4 cwts.; and two loaded carriages drawn by it on the trial weighed 9 tons 11 cwts. Thus the drawn weight was 12 tons 15 cwts., and the gross load 17 tons. The average speed attained at the trial was 14 miles per hour, though the engine attained at one time a maximum speed of 29 miles per hour.

The *Rocket* comprised the three elements of efficiency of the modern locomotive:—First, the internal water-surrounded firebox and the multitubular flue in the boiler, being a number of small tubes in place of one large tube, as in Trevithick's engine; second, the blast-pipe, from which the waste steam of the engine was exhausted up the chimney; third, the direct connection of the two steam-cylinders, one on each side of the engine, with the driving-wheels, on one axle. The subdivision of the flue into a number of small tubes proved to be of marvellous advantage in accelerating the absorption of heat by the water and the generation of steam in virtue of the great increase of heated surface exposed to the water without adding to the size or weight of the boiler. But the evaporating tubes would have been of little avail had they not been supplemented by the blast-pipe in the chimney, which by ejecting the steam from the engine, after it had done its work in the cylinder, straight up the chimney, excited a strong draught through the boiler, and caused a brisk and rapid combustion of fuel and generation of heat. The heat was absorbed with proportional rapidity through the newly-applied heating-tubes. The blast-pipe, thus designedly applied, in conjunction with the multitubular flue, altered and vastly improved the range and capacity of the locomotive; and, in further conjunction with the direct connection of the steam-cylinder to one axle and pair of wheels, it was tantamount to a new and original machine.

Fledged and armed with wings, the locomotive, the *Rocket*, subsequently drew an average gross load of 40 tons behind the tender at 13·3 miles per hour. The old Killingworth engine could only work at a maximum of 6 miles per hour with 50 tons. The *Rocket*, in the earlier trial, attained a speed of 29 miles per hour. George Stephenson came eminently at the right time in scientific history, gathering into one magnificent fact all the floating prophecies of possibilities, solving the problem, and setting the question of the railway and the locomotive engine at rest for ever by his grand and masterly invention.

The key-note was struck. Constructors on all sides worked, each in his own way, at the locomotive, to improve the detail and increase the efficiency; and for many years the practice of builders was moulded into two general classes of engines, with two cylinders placed horizontally inside the smoke box, under the chimney, and otherwise essentially similar to each other, except in one great feature, the number and disposition of the wheels. In one class there were six wheels, of which one pair was placed behind the boiler, typified in the engines of the day made by Mr. Robert Stephenson; in the

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other class there were but four wheels, placed under the barrel of the boiler, leaving the firebox overhung, typified in the engines made by Mr. Bury for the London and Birmingham Railway. Experience has demonstrated the disadvantage of an overhung mass, with a very limited wheel-base, in the four-wheeled engine running at high speed; and now it is the general practice to apply six wheels to locomotive engines.

The general features of modern locomotives are represented in Pl. CXVII.—CXXII. There are two leading types of passenger engines, distinguished chiely by the steam-cylinders being, in the first, situated within the framing, under the boiler, with the main driving axle cranked at two points to receive the power from the two cylinders; and in the second type the steam-cylinders are placed external to the framing, and connected, not to the axle, which is straight, but to crank-pins fixed between the spokes of the wheels in connection with the nave. From these distinguishing features the two types of engines are known respectively as 'inside-cylinder locomotives' and 'outside-cylinder locomotives.' In the latter the general contour of the cylinders is usually visible at the fore end of the machine. The tenders have six or four wheels, according to the taste of the designer, and they are supplied with powerful brakes, worked by screws, with blocks of wood placed against each wheel. A water-tank forms the upper part of the tender, namely, the two sides and the back, in the form of a horse-shoe, holding from 800 to 1500 gallons; and in the hollow of the shoe the fuel is deposited, of which a full charge may weigh from 30 cwts. to 2 tons. The engine and tender are suspended on springs placed over the axle-bearings.

Similarly there are inside-cylinder goods-locomotives and outside-cylinder goods-locomotives. In the former the wheels are all of one size, in order that the driving force may be transmitted from the central pair of wheels to the front and back pairs by means of coupling-rods attached to crank-pins in the wheels, hence called a six-coupled engine. In the latter engine the hind-wheels only are coupled with the central wheels, and the fore-wheels are of less diameter, as, being free, they are not required to be so large, hence called a four-coupled engine. The six-coupled engine can take the heaviest train on a good straight railway, that is, on one free, to a large extent, of curves or sudden turns in the line of direction of the train; but the four-coupled works more economically on curved lines, and may be made so as to take, in average practice, as heavy a load as the six-coupled engine.

American practice, after having passed through various phases, has arrived at two great types of locomotive for passenger and for goods traffic, which are universally adopted in the United States. The passenger-locomotive has eight wheels, of which four in front are placed in a movable frame called a 'bogie' or 'truck,' which swivels on a central pivot, and adapts itself to the curves of the lines; the four wheels behind are the 'drivers;' they are larger than the front wheels, and of equal size and coupled. The cylinders are placed outside, just over the truck, horizontally. A 'cab' or 'house' is placed upon the hinder part of the machine, behind the boiler, for the protection of the engine-driver and the stoker from the weather, with ample glazed openings to afford a clear view ahead. The chimney or 'stalk' is in form exactly like an inverted cone, expanding upwards; internally it is cylindrical, and the space between the outer and inner chimneys forms a reservoir for cinders and ashes thrown up through the inner chimney, which are deflected over a baffle-plate at the top, and thrown over into the reservoir, trap, or 'spark-catcher.' This contrivance is specially designed for the use of wood as fuel, and to prevent the risk of conflagration arising from the numerous sparks which would otherwise be discharged in passing through forests and other ignitible districts. As a further precaution for the prevention of sparks the top of the stalk is covered with a fine wire-net. The steam-whistle is situated above the boiler for ordinary use; and the bell is hung near to the cab with ropes within reach of the engineman. The bell is used in passing through the streets. The cow-catcher is hung in front of the engine to ward off stray cattle, &c., and the American flag is hung behind it. The tender is carried on light wheels, disposed under two trucks, fore and aft, to facilitate the turning of the tender on the curves. The goods locomotive is placed upon ten wheels, of which six are coupled, to supply driving-power, and the leading four wheels are placed in a swivelling truck.

The earliest four-wheeled engines made by Messrs. Stephenson & Co. as an article of manufacture weighed 9 tons 'with the steam up,' that is, with a supply of fuel and water in the boiler. The six-wheeled engines weighed 11½ tons. An ordinary passenger locomotive of the present time weighs from 20 to 25 tons, and occasionally as much as 27 tons, which is excessive. A goods locomotive of the most powerful stamp weighs from 27 to 32 tons, distributed on six coupled-wheels. Tenders weigh from 10 to 15 tons, with fuel and water supply. Tank-locomotives, or such as are constructed to carry their supply of fuel and water in reserve without the aid of a tender, weigh a few tons heavier than the same engine if fitted with a tender. But tank-locomotives are usually made of small size, to work light branch traffic, and weigh lighter in consequence than most other engines, or from 10 to 20 tons gross. The Great Western broad-gauge eight-wheel passenger engines weigh 35 tons, or with tender 50 tons. But the heavy tank-engines used on the steep lines of South Wales and elsewhere weigh 40 tons gross.

Passenger-locomotives are commonly made with cylinders 15 or 16 inches in diameter, with a stroke of 20 to 24 inches, and driving-wheels varying from 5½ to 7 feet diameter, according to the duty for which the engine is made; for high-speed express trains the larger wheel is used. The cost of a modern passenger locomotive and tender is about £2700. Ordinary goods-locomotives have cylinders 16 inches diameter and 24 inches stroke, with 5 feet wheels. They cost about £3500 with tender. The fire-grates are 3 feet to 4 feet in length, and about 3 feet 6 inches wide; and the boilers contain from 150 to 230 small flue-tubes, about 2 inches in diameter and 10 to 11 feet in length.

Express trains are drawn by locomotive engines at a usual speed of 45 miles per hour, and frequently the speed is equal to 60 miles per hour, on certain parts of railways, with heavy express trains. The highest speed on record ever attained by a locomotive engine was 65 miles per hour, which is more than a mile in one minute, or nearly 100 feet in a second—twice as fast as the fleetest race-horse. The most powerful goods-engines are capable of drawing goods-trains consisting of thirty-five waggons loaded with 6 or 7 tons of goods in each, or a total load of 200 to 240 tons of goods, amounting, with the weight of the waggons themselves, to 400 tons altogether. If the railways were level throughout a goods-engine would draw more than 1000 tons weight of train at 10 miles an hour.

References to Plates.—Pl. CXVII.-CXVIII. shows in sectional elevation a six-wheeled locomotive for passenger trains, the different members of which are succinctly specified by the annexed literal references:—

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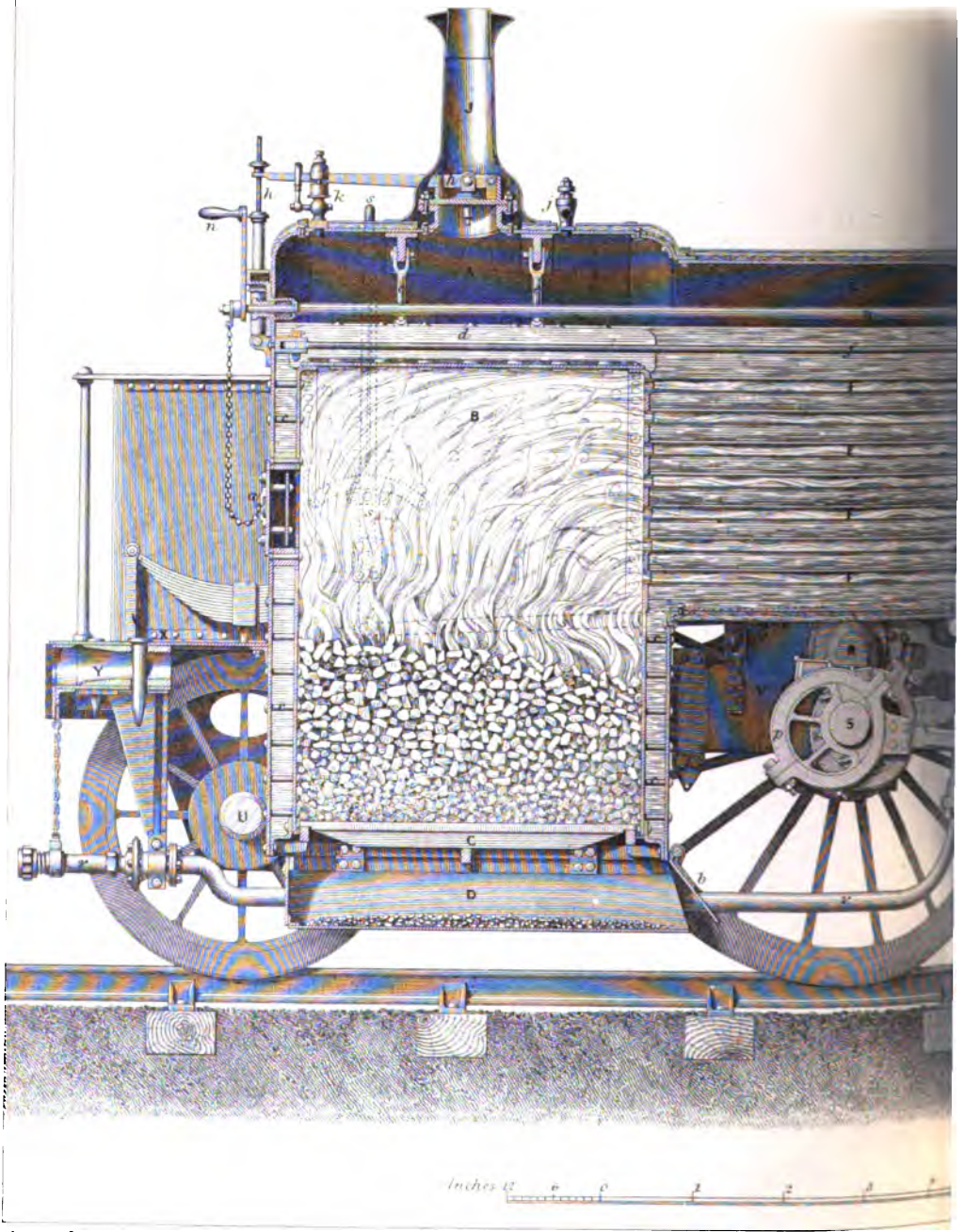
LOCOMO

LONGITUDINAL SECTION TO ILLUST



Drawn by David Kirkaldy

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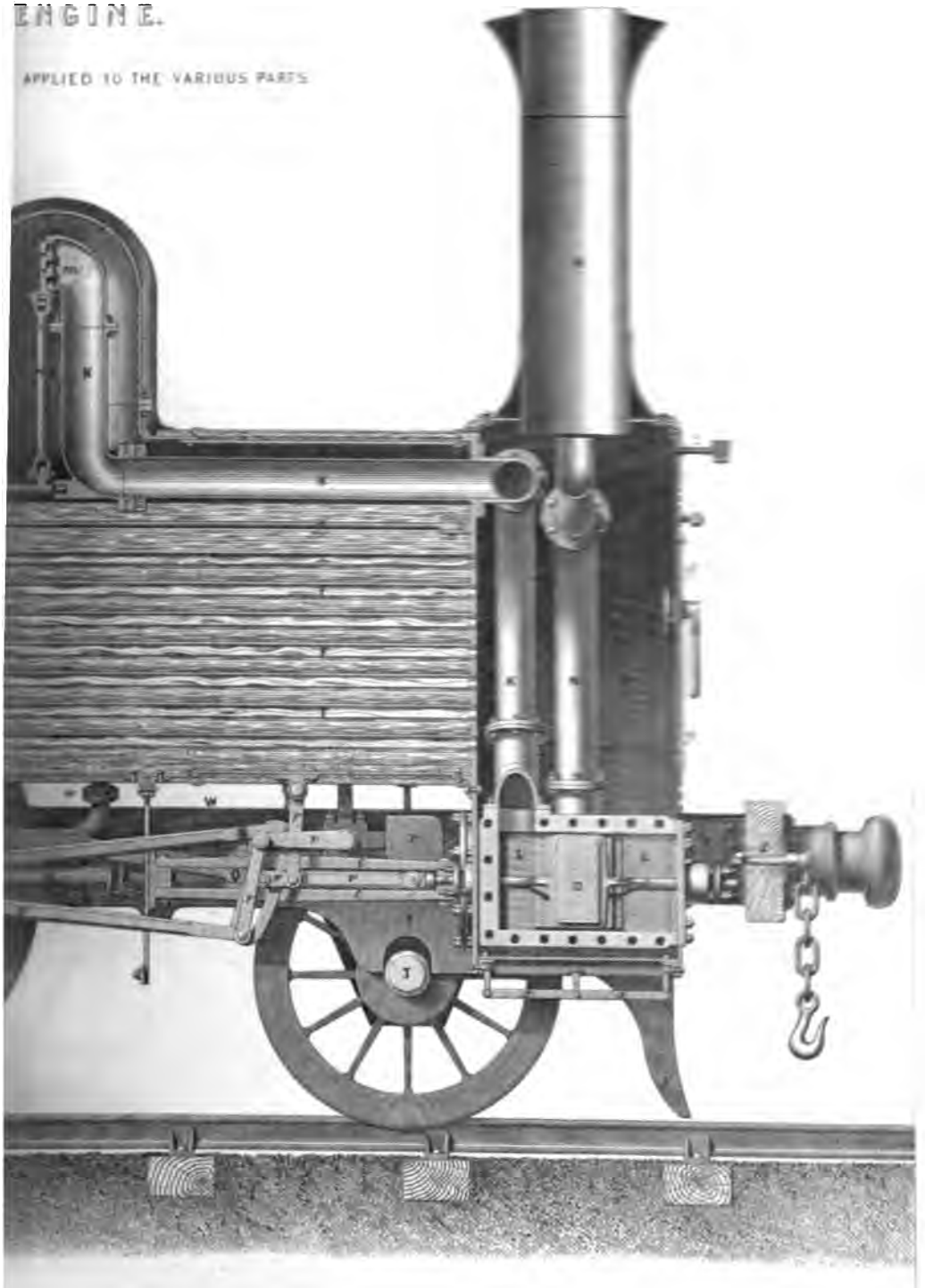
BLACKIE & SON GLASG

ENGINE.

APPLIED TO THE VARIOUS PARTS



6 7 8 9 10 feet

Engraved by J. W. Lowry

EDINBURGH & LONDON

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A Fire-box shell.
B Internal fire-box.
C Grate or fire-bars.
D Ash-pan.
E Cylindrical part of boiler.
F Flue-tubes.
G Smoke-box.
H Chimney.
I Steam-dome.
J Steam-chimney.
K Steam-pipe.
L Valve-chest of cylinder.
(M) Steam-cylinder (not seen).
N Exhaust and blast pipe.
O Slide-valve.
(P) Piston-rod (not seen).
Q Connecting-rod.
R Driving-crank.
S Driving or crank axle.
T Fore-axle.
U Hind-axle.
V Inside framing.
W Outside framing.
X Foot-plate.
Y Draw-plates.
Z Buffer-beam.
a Fire-door.
b Draught-regulator or ash-pan damper.
c Stays binding fire-box to shell.
d Stays supporting fire-box roof
e Stays binding crown to fire-box roof.
f Stays binding fire-box to smoke-box.
g Smoke-box door with closing handle.
h Safety-valve.
(i) Water-gauge and cocks (not seen).
j Water-heating cock.
k Steam-whistle.
(l) Water blow-off cock (not seen).
m Steam-regulator valve.
n Gear for working regulator-valve.
o Steam valve-rod.
p Eccentric and rod for driving backward.
q Eccentric and rod for driving forward.
r Valve-link and working gear.
s Reversing-handle and gear.
t Piston-rod guides.
u Feed-pump and plunger.
v Feed-pipe from tender-tank.
w Feed-pipe from pump to boiler.
x Water-cocks on cylinder with gear.
y Safety-guard for clearing rail.
z Bracket for signal-lamp.

The Fire-box.—The first part of the engine which claims our attention is the fire-box. It consists of two parts: the fire-box shell A, which in reality forms part of the boiler, being filled with water to about 15 inches from the top; and the fire-box B, placed within the other, and which contains the fuel for generating steam. The internal fire-box B is made of copper, and tapered slightly towards the top, for the purpose of allowing the globules of steam which are formed on its sides to ascend more freely. To resist the downward pressure of the steam the roof is strengthened by the strong malleable-iron stays *d*, bolted across, and having a bearing against its sides, while both external and internal fire-boxes are secured against the lateral strain by having numerous iron stay-bolts *c*, *c*, *c* screwed through both boxes, and rivetted at each end. The fire-door *a* affords access to the internal fire-box for the admission of the fuel. It is of an oval form, and the latch is provided with a chain for the greater convenience of opening and shutting. The space between the two fire-boxes at that part where the fire-door is situated is filled by an oval-shaped frame, securely rivetted through both, and the fire-door itself is furnished with a plate of iron rivetted to the inside at some little distance from it, to save it from warping by the intensity of the heat within. The fire-bars C are ranged parallel to each other on a wrought-iron frame fixed to the under side of the fire-box, and a portion of them is so arranged as to admit of their falling at one end on the removal of the pin which supports them. In this case the burning fuel drops into the ash-box D fixed below to receive it, and the combustion almost immediately ceases. The draught is regulated by the valve or door *b*.

The Boiler.—As before remarked, the external fire-box A forms part of the boiler, communicating freely with it, and being, like it, filled with water to the proper height when the engine is in operation. The barrel of the boiler is marked E in the plate. It is traversed throughout its length by a series of brass tubes F, F, F. These tubes are inserted into the front or tube-plate of the internal fire-box, which is made of a sheet of copper considerably thicker than the other plates of which the fire-box is composed, so as to afford a better bearing for the fixing of the tubes. At the front extremity of the boiler they pass through a similar plate of iron, which forms the partition between the boiler E and the smoke-box G. Into these plates the tubes are secured at both ends by rivetting, and subsequently by strong steel ferrules accurately turned and driven firmly into the interior of the tubes, so as to render them perfectly tight and free from leakage. The tubes secure the boiler against the pressure in a longitudinal direction; and for further safety three strong malleable-iron stay-bolts *f*, *f*, *f* traverse the whole length of the boiler, and are secured to it by round pins passing through brackets rivetted to the front tube-plate and to the back plate of the external fire-box. The whole boiler is covered externally with a coating of thick felt and with strips of wood, called the *lagging* or *cleading*, to prevent the radiation of heat, as well as to give greater symmetry of appearance.

The Smoke-box.—The tubes F, F all open into that part of the boiler called the smoke-box, G, the purpose of which is to collect the gases evolved by the combustion of the fuel, and to transmit them through the chimney H into the air. In this compartment of the boiler are also placed the steam cylinders and other very important parts of the engine. The front plate of the smoke-box is furnished with a large folding door *g*, fitted air-tight to it, and provided with a handle for shutting and fixing it. This door affords access for the insertion and cleaning of the tubes, as well as for the examination and repair of the parts of the engine referred to above.

The Safety-valves and Boiler Mountings.—The boiler is provided with two safety-valves *h* (only one shown in the engraving, the other being on part of boiler removed), both placed in one chest, fixed on the summit of the external-fire-box, and surrounded by a polished brass chimney J, of a form symmetrical with that of the large chimney H. The valve shown is of the kind called the *lever safety-valve*, can be regulated to any required degree of pressure by the engine-driver, being furnished with a *spring-balance*, by which the amount of pressure is distinctly indicated. The other safety-valve is inaccessible, and is loaded by a spiral spring and screws to such a pressure as may be considered safe, yet higher than the engine is expected under ordinary circumstances to require. To indicate the height at which the water stands in the boiler, and to enable the driver to keep it always at its proper level, a set of gauge-cocks and glass tube, communicating with the water inside, are fixed at a convenient situation near the foot-plate X. These are on the part of boiler removed. A graduated scale is fixed behind the glass tube, and the required level may thus be maintained with considerable accuracy. As a precaution against accidents, and to give notice of the approach of the engine, a steam-whistle K is attached to the top of the fire-box, and communicates with the steam within by a short pipe, provided with a stop-cock. The internal construction of the whistle is such that when the stop-cock is opened the steam, rushing out with great force, encounters the sharp edges of a species of inverted cup, thereby emitting

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a shrill and very loud noise, which can be heard at the distance of several miles. Behind, and at the lowest extremity of the fire-box, is situated the *blow-off cock* (not seen in the plate), by which the boiler may be emptied of water when required; and for the purpose of cleansing it of the accumulation of sediment which is constantly being formed in it when the engine is in operation, it is provided with *mud-holes* both at fire-box and smoke-box ends. These mud-holes are secured when the engine is at work, by covers or *doors* bearing against the *inside* of the boiler, and fixed each by a single bolt passing through a strong wrought-iron bridge bearing against the outside.

The Steam-pipes and Regulator Valve.—The steam-chest or receiver I rises from the centre of the cylindrical part of the boiler, and is carried to a considerable height above it, in order that the mouth of the steam-pipe K, which opens into it, may be removed to as great a height as can conveniently be obtained, from the surface of the water in the boiler. The object of thus raising the open orifice of the steam-pipe is to prevent *priming*, that is, the ascent of water along with the steam, and its consequent flow through the steam-pipe into the cylinders, where its presence in any considerable quantity would produce the most serious inconveniences, besides the danger to which the boiler would be exposed by its rapid abstraction. The steam-receiver is surrounded by a polished brass dome, which, besides being highly ornamental to the engine, serves the very important purpose of diminishing the radiation of heat, by interposing a stratum of heated air between the steam-chest and the external atmosphere. The steam-pipe K is made of copper, and enters an orifice, accurately bored and fitted to receive it, in the cast-iron *regulator-valve chest m*, which is bolted steam-tight to the exterior of the front tube-plate of the boiler. The valve-chest *m* incloses a regulator-valve so formed as, when placed in the position shown in the plate, completely to cover the orifices, that no steam can enter the pipe K. The regulator-valve is worked by means of the lever and the long rod *n* traversing the whole length of the boiler, and passing steam-tight through a stuffing-box in the back plate of the fire-box. A long lever-handle *n* is fixed to the outer extremity of this rod, and the engine-driver is thereby enabled, with the greatest ease and precision, to regulate the supply of steam to the cylinders. The steam-pipe K forms a communication for the admission of steam from the regulator-valve chest *m*, into the valve-casing or steam-chest L, L. In the smoke-box G the steam-pipe K, as well as the exhaust and discharge pipe N, are each divided into two branches, and bent so as not to obstruct the cleaning or replacing of the tubes.

The Cylinders and Valves.—The slide-valve O is placed between the cylinders M, M, in the steam-chest L, formed by the construction of the cylinders when bolted together. The steam-ports, which communicate between each extremity of the cylinders and the slide-valves O, are formed in the body of the cylinders, as are also the discharge-ports, to the point where the blast-pipes are jointed to them. The discharge or blast pipes N ascend from each cylinder till they reach the bottom of the chimney H, where they are formed into one pipe.

The Inside-framing and Connections of the Engine.—Having described the internal arrangements of the engine we now proceed to explain the parts by which motion is communicated to the wheels. Between the smoke-box and external fire-box are bolted the two strong malleable iron beams V, called the *inside-framing*, and which, besides imparting great strength and rigidity to the whole structure, serve the purpose of giving fixed points of resistance for the bearings of the working parts. Of these, the first that claim our attention are the piston-rods. These are made of steel, turned truly cylindrical and smooth; at one extremity they are fixed into the cylinder-pistons, and at the other they are terminated each by a cross-head. On these crossheads are bearings for the small ends of the connecting-rods Q; and concentric, and of the same piece with these bearings, are projecting arms into which guide-blocks are fitted. These guide-blocks are formed with flanges, and are accurately fitted and ground into the steel-bars, or guide-bars, *t*, *t*, so as to work smoothly and steadily between them. These latter are set truly parallel and in the same plane with the centre of the piston-rods, and are firmly bolted at one end to the cylinders, and the other to the cross-framing plate. By this means the piston-rods are constrained to move in a rectilinear direction, and secured against any deflection or undue strain arising from the continual change of position of the opposite ends of the connecting-rods, in obedience to the revolution of the cranks to which they are respectively attached. The feed-pumps *u*, for the supply of water to the boiler, are also set in the line of the piston-rods, and their plungers partake of their motion, being each fixed to a small arm firmly secured to the piston-crosshead. The plungers are of brass, and at each stroke of the engine draw the water from the tender through the feed-pipe *v* and lower or suction valve, forcing it at the return stroke through upper or delivery valve, and along the pipe *w* into the boiler. At the point where the water is discharged into the boiler is placed a valve-box, within which is a valve opening upwards, for the retention of the water within the boiler. A small cock, called the *pet-cock*, is fixed to the outside of the feed-pump, and by means of a long slender rod the handle is brought within reach of the engine-driver, so that he may be enabled to ascertain at any time whether the pump is working efficiently. The connecting-rods Q are jointed, as we have before explained, to the crossheads of the piston-rods. The opposite ends are attached to the cranks R upon the axle S of the driving-wheels. This cranked axle is made of the best forged iron, and the two cranks are formed exactly at right angles to each other, in order that the one connecting-rod alternately may assist the other in turning their centres, and equalize the motion.

The Eccentrics and Valve-gear.—Each engine is provided with two eccentrics and rods for working the slide-valve, namely one, *q*, when the locomotive is required to move forward (or to the right hand of the plate), the other, *p*, when in the opposite direction, or backwards. Each eccentric is formed in halves, for the purpose of embracing the axle, and these are joined immovably together, and fixed firmly to the driving axle S in their proper positions. The forward eccentrics for both cylinders are fixed upon the axle a little *in advance* of a line at right angles to their respective cranks, for the purpose of giving the required *lead;* and the position of the backward eccentrics is adjusted upon the same principle, though of course in a diametrically opposite direction. The eccentric-rods *p*, *q* are bolted firmly to the brass strap surrounding the eccentrics, and their opposite extremities are connected together by the expansion-link, which is so formed as to admit of either forward or backward eccentric being thrown into gear with the valve-spindle *o*, as may be required; or the valve may be caused to partake more or less of the movements of both eccentrics, the effect of which is to cause it to cut off the steam when the piston has described only part of the stroke, so that the steam thus shut into the cylinder is left to itself to expand

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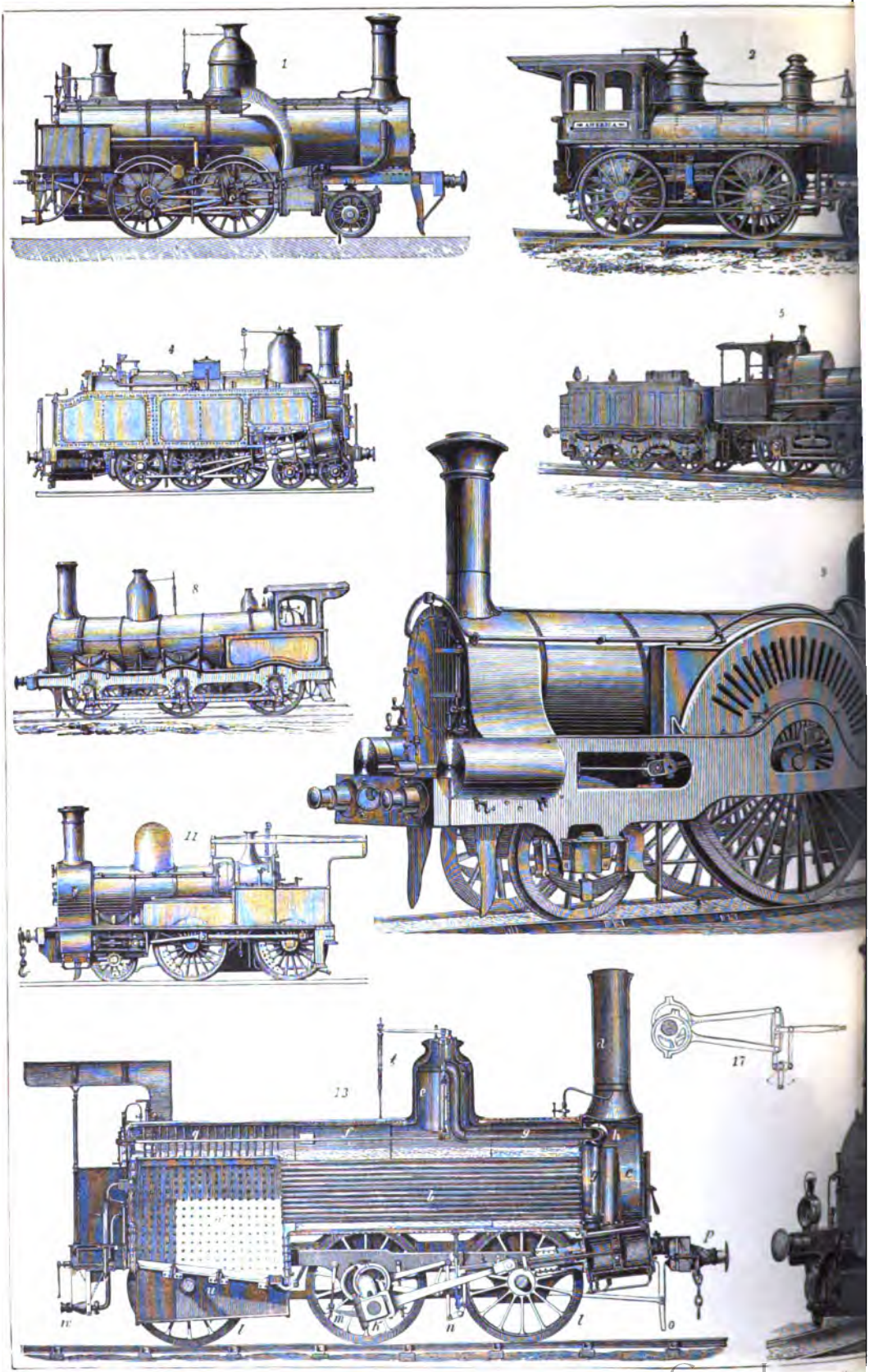

Fig. *1*, Continental Mixed Locomotive. *2*, North American Passenger Locomotive. *3*, English Passenger Locomotive. Collieries, &c. *8*, English Goods Locomotive. *9*, Locomotive for swift trains in use on the Caledonian Railway. *13*. Sectional Elevation of fig. 6 on an enlarged scale. *14*, Liliput Locomotive for the metre gauge.

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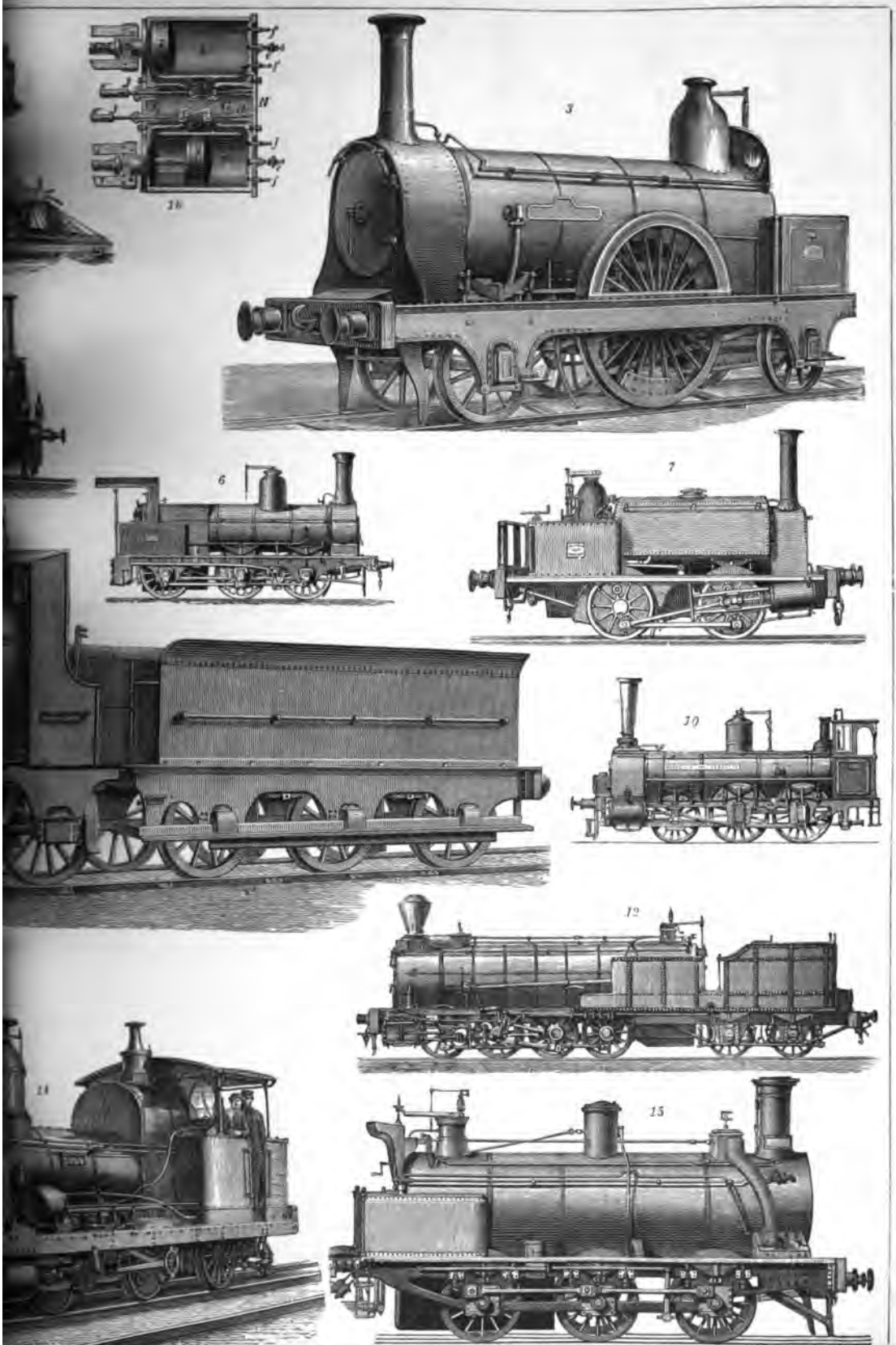

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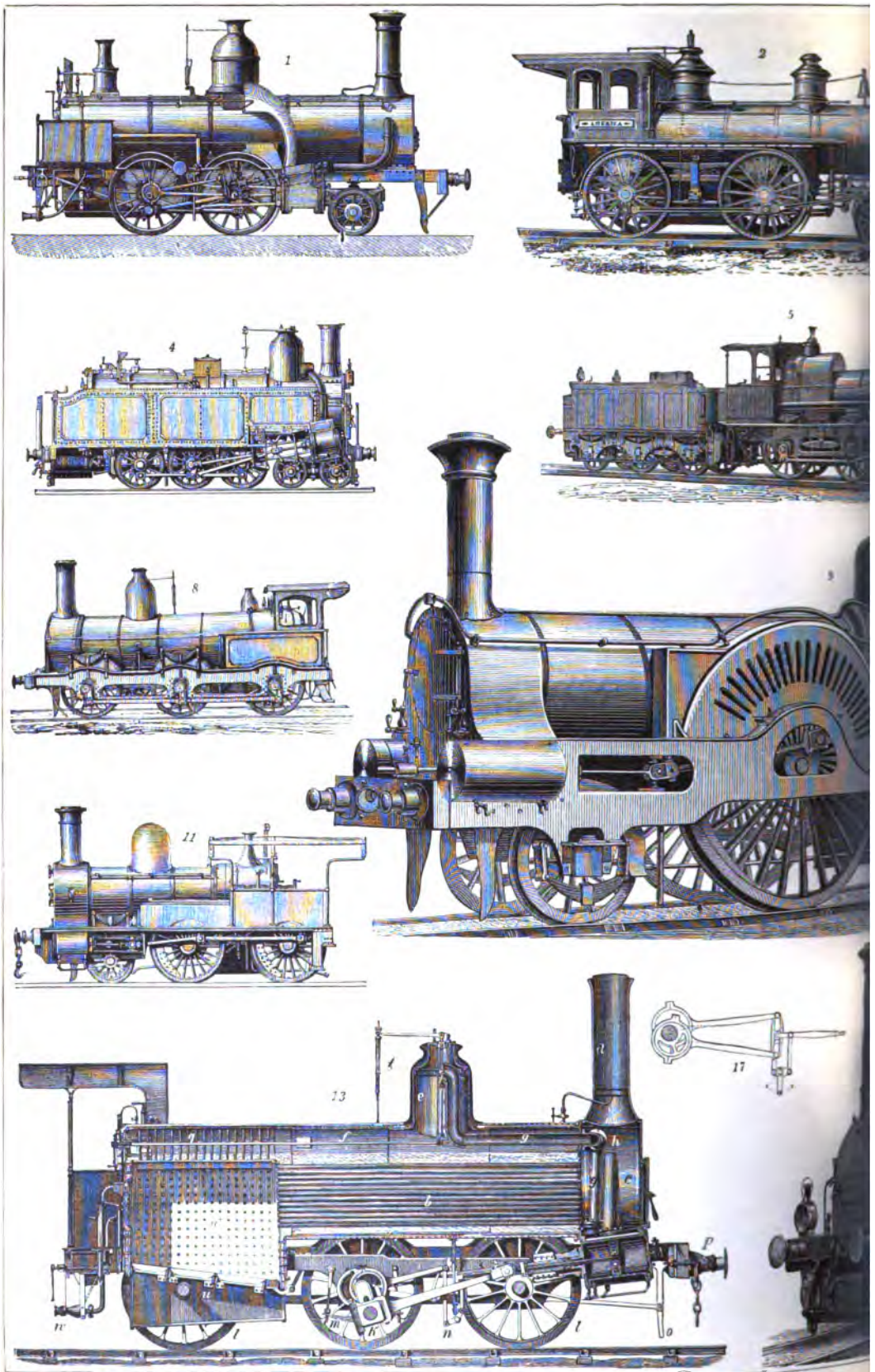

Fig. 1, Continental Mixed Locomotive. 2, North American Passenger Locomotive. 3, English Passenger Locomotive. Collieries, &c. 8, English Goods Locomotive. 9, Locomotive for swift trains in use on the Caledonian Railway. Railway. 13 Sectional Elevation of fig. 6 on an enlarged scale. 14, Liliput Locomotive for the metre gauge.

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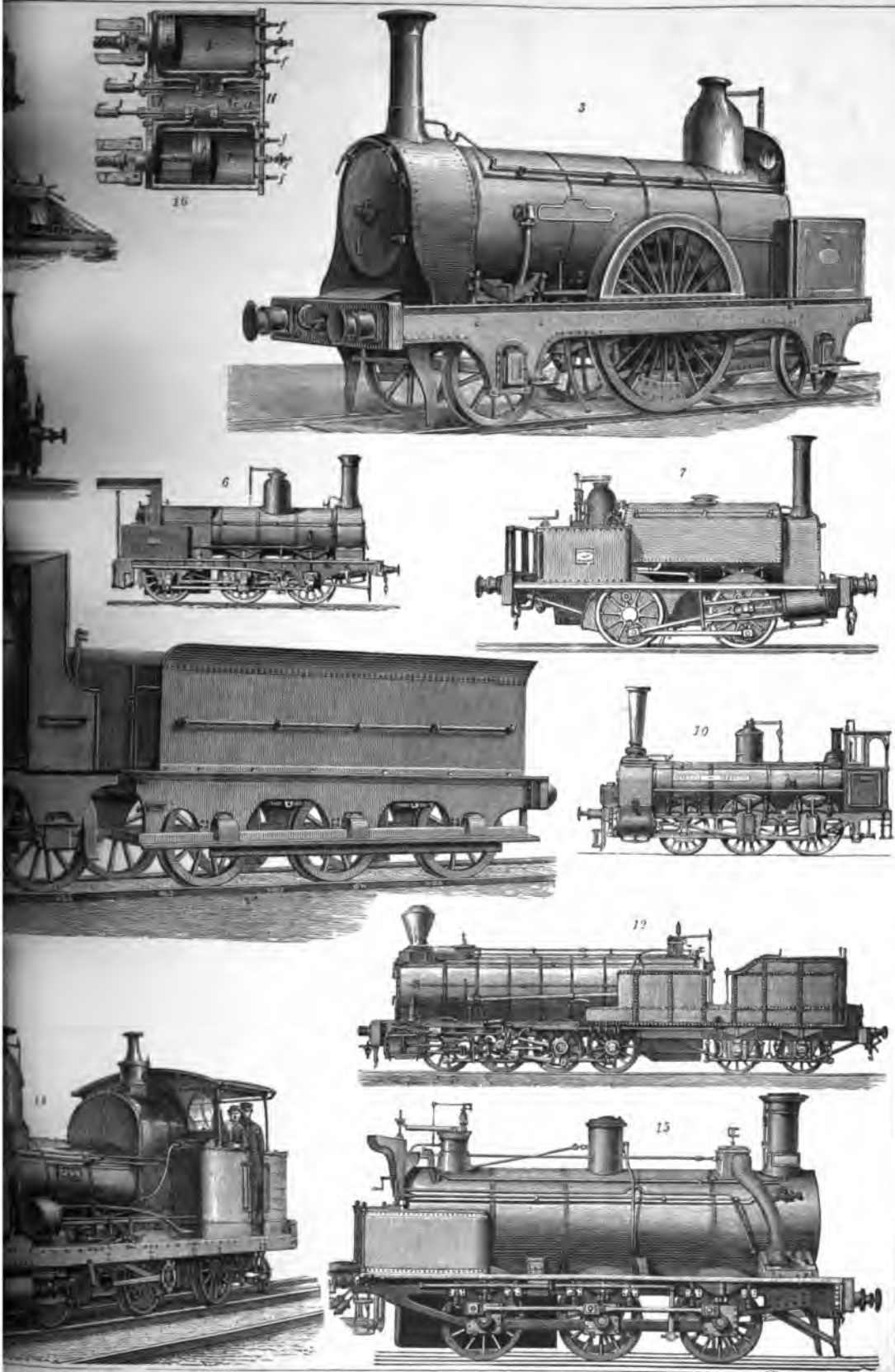

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and press upon the piston for the remainder of the stroke. The *reversing gear*, or mechanism by which the engine-driver is enabled to cause the engine to move in either direction, consists of a system of rods and levers *s*, *s*, *s*, commencing with a stud upon the lower extremity of the valve or slot-link *r*, and terminating in a long handle *s* placed in a convenient position near the foot-plate X. The motion of the eccentrics is communicated *directly* to the slide-valves O by means of the connecting-links *r* and the valve spindles *o*.

The Outside-framing—Wheels and Springs.—The external-framing consists of two strong parallel beams W, extending somewhat beyond the engine at both ends, and connected in front by the wooden cross-beam or *buffer-bar* Z, and behind by the iron cross-beam or *tender-beam* Y, on which rests the foot-plate X. These beams are firmly bound together at the corners by angular plates of iron bolted through each; and the weight of the boiler is supported upon them by the strong malleable iron brackets or stays rivetted to the boiler and bolted through the outside-framing W. These latter are formed each of two parallel plates of iron cut out into the form required, with *horns* projecting downwards for the bearings of the wheels. Between each pair of plates a beam of well-seasoned oak is interposed, and the whole firmly bolted together. To deaden the shocks to which the engine is exposed it is provided with *buffers*, fixed to and projecting in front of the buffer-bar Z. These buffers are a species of elastic cushions formed of horse hair, surrounded by strong leather, and further strengthened by slender wrought-iron hoops. To secure the engine against the effects of the wheels coming in contact with stones, or other obstacles which may happen to be lying on the rails, it is furnished with strong wrought-iron *safety-guards* y, descending from the external-framing to within a short distance of each rail, and so formed at the points as to turn aside any object with which they may come into collision. As the whole weight of the engine rests upon the wheels, it may be expected to suffer from jolting in passing over the irregularities of the rails. To obviate this as far as possible strong springs are interposed. Each spring is composed of thin layers of steel, gradually diminishing in length from the centre to the extremities. The ends of the uppermost and longest layer are firmly secured to the outside-framing by means of the spring-links, the length of which can be altered so that the weight which it may be thought expedient to throw upon each spring can be accurately adjusted. The various layers forming the spring are bound together in the centre by a hoop, from which a rod descends to the top of the axle-box. The axle-box, fitted with bearings composed of gun-metal or other metallic alloy favourable for the reduction of friction, slides up and down with the yielding of the spring in the axle-guide, formed on the outside-framing.

Miscellaneous.—Any water which may happen to accumulate in the cylinders, whether from the priming of the boiler or the condensation of the steam, and which, unless removed from time to time, would be very detrimental to the working of the engine, is let off by means of the water-cocks *x* at each end of the cylinder, which can be worked by the driver from the foot-plate X by means of rods and lever. Upon the front of the smoke-box, and towards the top, is fixed a small bracket *z* for supporting the signal-lamp, by which notice is given at night of the approach of the engine and train. As a precaution against accident to the engine-driver and his assistant, hand-rails are erected on each side of the foot-plate X, and these are continued along the whole length of the boiler and front of smoke-box, so that they may be enabled with comparative safety to walk round the engine, even when it is in rapid motion. When the engine is at rest the steam, which would otherwise escape at the safety-valve and be thrown to waste, is made available for the heating of the water in the tender. This is accomplished by means of a bent pipe and stop-cock *j*, by which a communication is made between the steam within the fire-box and the feed-pipe *v*, and thereby a considerable saving of fuel is effected. The connection of the engine with the tender containing a supply of water and fuel, is made by means of a strong double link or drag-bar, one end of which is secured by a strong pin to a bracket Y fixed under the foot-plate X of the engine, while the other is in a similar manner jointed to the drag-springs of the tender.

The Action of the Engine.—As compactness and lightness are of paramount importance in a locomotive engine, *the condenser and its appendages* are dispensed with. The steam is admitted into the cylinder by means of the steam-valve, in a similar manner as in the stationary condensing engine already described; but the steam having moved the piston from one end of the cylinder to the other, is allowed to escape intc the open air, thus losing the power obtainable from the *vacuum-forming* property of steam. In stationary engines the crank-shaft only requires to be driven in one direction, whereas locomotive engines must be capable of moving both backward and forward, thus requiring two eccentrics for working the valve, and the complicated reversing gear which has already been explained.

References to Plate CXIX.-CXX.—This plate comprises illustrations of fourteen different classes of locomotive, severally designated on the plate. The most prominent of these, as leading types of English passenger-engines, are figs. 3 and 9, of which fig. 3 represents a powerful class having inside cylinders, and fig. 9 a powerful class having outside cylinders. The first engine has driving-wheels of 7 feet in diameter, with cylinders 16 inches in diameter, having a stroke of 22 inches. The weight of the engine, empty, is 26 tons 13 cwts.; with fuel and water, 30 tons. The second engine, designed after a class that came into vogue in 1860–62, has driving-wheels specially large in diameter, being 8 feet 2 inches high; and the cylinders are 17½ inches in diameter, with 24 inches of stroke. The motive for the adoption of so large a wheel was that the engine might be run at a very high speed without excessively quick reciprocation of the machinery. The Belgian locomotive, shown by figs. 6 and 13, fairly exemplifies a common class of goods engine, having inside cylinders and six wheels all coupled. In the sectional view, fig. 13, certain of the organs are shown more clearly than in Pl. CXVII.–CXVIII., which has been fully described. *a* is the fire-box, which is of great length, adapted, by giving a large grate, for burning small coal and slack; *b* are the flue-tubes; *c*, the smoke-box; *d*, the chimney; *e*, the steam-dome; *f*, the rod for the regulator, worked from the back of the boiler; *g*, *g*, the steam-pipe; *h*, the blast-pipe; *k*, the end of the connecting-rod where it joins the crank; *l*, *m*, *l*, the three driving-wheels on the far side, all of one diameter; *n*, the reversing-gear; *o*, the safety-guard; *p*, the buffer; *q*, the fire-box shell; *u*, the ash-pan; *w*, the union-coupling between the feed water-pipe from the tender and that to the boiler. One of the cylinders is shown in section under the smoke-box, with the piston at half-stroke. Fig. 16 shows both cylinders, with their valves and valve-chest common to both, in section horizontally. F, F are the cylinders; *j*, *j* are the pistons, with their rods *o*, *o*; *g* is the valve-chest; *é*, *é* are the guiding heads of the valve-spindles. The valve gear is shown apart in fig. 17. Figs. 4

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and 12 are examples of mountain locomotives with outside cylinders, the first having six coupled wheels with a swivelling bogie or four-wheeled truck under the fore-part of the engine, to yield to the quick curves which are generally associated with steep inclines, and facilitate the ascent. The second, fig. 12, has eight wheels all coupled, for the sake of utilizing the whole of the weight of the engine for the purpose of adhesion to give a fulcrum for the great traction force required. The liliputian locomotive, fig. 14, for narrow-gauge railways of from 3 feet to 3 feet 6 inches gauge, is similar to such as have been constructed for the Indian narrow-gauge railways. Fig. 7 shows a very common form of tank-locomotive, on four wheels, coupled with outside cylinders, of medium weight, from 10 to 15 tons. It is much used in the local service of collieries and in other large establishments, such as the Burton breweries. Engines of this kind are also used in the goods stations of railways for marshalling goods trains. Fig. 2 represents the regular North American passenger-engine, of which a brief outline description has already been given.

Pl. CXXI.–CXXII. contains illustrations for the most part of common-road steam-carriages and traction-engines. It contains also (fig. 7) a general view of Fell's system of mountain-locomotive, as employed on the Mont Cenis Railway across the Alps, and a plan of the same (fig. 8) partially in section, to expose the machinery. On this system, a central rail is laid down in the middle of the line, which is gripped between two pairs of wheels, turning horizontally, placed under the engine and driven by it, in addition to the usual carrying wheels, of which there are two pairs, coupled and driven by the engine. The engines weigh from 16 to 20 tons, and the horizontal wheels grip the central rail with a force of 24 tons, together making at least 40 tons of pressure available by its adhesion for the exertion of driving power. There is one pair of cylinders 15 inches in diameter, with a stroke of 16 inches; the pressure in the boiler is 120 lbs. per square inch. The gross weight of goods-train taken up the inclines of 1 in 12 was 40 tons, and of passenger-train, 24 tons. Fig. 6 is a locomotive designed by Mr. N. Grew, with one pair of wheels, the drivers and a swivelling sledge in front, for travelling on ice; it was sent to work on the Neva at St. Petersburg. Fig. 9 is an American tender for locomotives; it is carried upon two swivelling bogies. Fig. 10 is a sectional view of a tender, showing the system in use on the London and North-Western Railway for picking up water to replenish the tender while the train is in motion. A spout is lowered, as shown in the figure, into a long shallow trough a quarter of a mile long, laid between the rails and kept full of water. By the forward velocity of the spout through the water, the water ascends and is discharged into the tank. When the tank is full the spout is raised out of the trough, and suspended for future use. Of the remaining figures, figs. 1 and 2 are traction-engines. Fig. 4 is Aveling and Porter's road locomotive crane-engine. Besides serving as an ordinary road locomotive, this engine has a crane attached for lifting and carrying weights up to five tons. It has strong wrought-iron driving-wheels, and extra wide front wheels, and is fitted with compensating motion, so that both wheels may take their fair proportion of the work in turning sharp curves without slipping. The engine is steered from the foot-plate, and the entire management—driving, steering, and working the crane—is performed by one person. Fig. 5 shows Fowler and Co.'s compound traction-engine, which is of the intermediate receiver type, the pistons driving cranks at right angles. The engine is mounted on large driving-wheels, and the leading wheels are much larger than usual, this being found to be a material advantage on a rough road. This engine has high and low pressure cylinders, respectively 6 inches and 10½ inches in diameter, with 12 inches stroke. The steam-carriages, figs. 3 and 11, are fitted for carrying passengers. The carriage, fig. 11, was constructed for Mr. George Salt, of Saltaire. It is designed as a private carriage to convey small excursion parties, though there is power enough to take forty passengers almost as easily as the ten or twelve persons for whom the seats are arranged. The maximum power is 30 actual horse-power, and the total weight in complete running order, with a supply of coal (6 cwts.) for thirty miles, is 6 tons. It has attained speeds of from 15 to 20 miles per hour, and can average 12 miles per hour; the driving-wheels are 4 feet in diameter, and 7 inches wide; the two cylinders are 6 inches in diameter, with a stroke of 8 inches.

Traction-engines are now for the most part employed in agricultural service, and many of them are adapted for driving machinery when they are placed in position.

Further information about locomotives, chiefly of a statistical character, will be found in the article RAILWAYS.

LOCRIS was a country of Middle Greece, whose inhabitants, the Locrians, were among the oldest Grecian people. There were four branches of them—the Epicnemidian, the Opuntian, Ozolian, and Epizephyrian Locrians. The last were a colony from the Ozolian stock, and lived in lower Italy. Their capital, Locri, was one of the most powerful, splendid, and wealthy cities of Magna Græcia.

LOCUS. When the conditions of a mathematical problem are not sufficient to determine the absolute position of a point, but restrict it to a certain line (or lines), this line is called the locus of the point. Thus if the base and area of a triangle are given, the locus of the vertex is a straight line parallel to the base. Again, if the distance of a point from another point is in a given ratio to its distance from a given fixed line, the locus of the point is a conic section.

LOCUST, the name applied to a genus of insects included in the section Locustina of the order Orthoptera. To the Locustina several other genera belong, some British grasshoppers (for example, *Tetrix*) being included in this tribe, although the grasshoppers proper belong to a different but allied section, that of the Gryllina. The grasshoppers and locusts, however, were formerly included in one genus, namely, *Gryllus*. The Cicadas (which see) of America are locally known as locusts. The locusts to be noticed in the present instance are therefore those to which this term is specifically and distinctly applicable, and among which the famed locust, so destructive in its habits, is included. The characters of the Locustina are founded firstly upon the form of the *tarsi* or feet, which in these insects are composed of three joints. The antennæ are of moderate length, and composed of from twenty to thirty joints. Besides the compound eyes which such insects possess, the Locustina possess three simple eyes or ocelli. The abdominal appendages of the females are not generally present in the form of an ovipositor. The hinder legs are greatly elongated, especially in the part corresponding to the thighs, and on this account the Locustina fall into the Saltatorial or Leaping Orthoptera. There are four wings, the front pair being much smaller than the hinder pair, being composed of a coriaceous or leathery material, and when folded meet like the sides of a house roof. The posterior wings are of large size, membranous, and when at rest are folded in a fan-like fashion. The nervure

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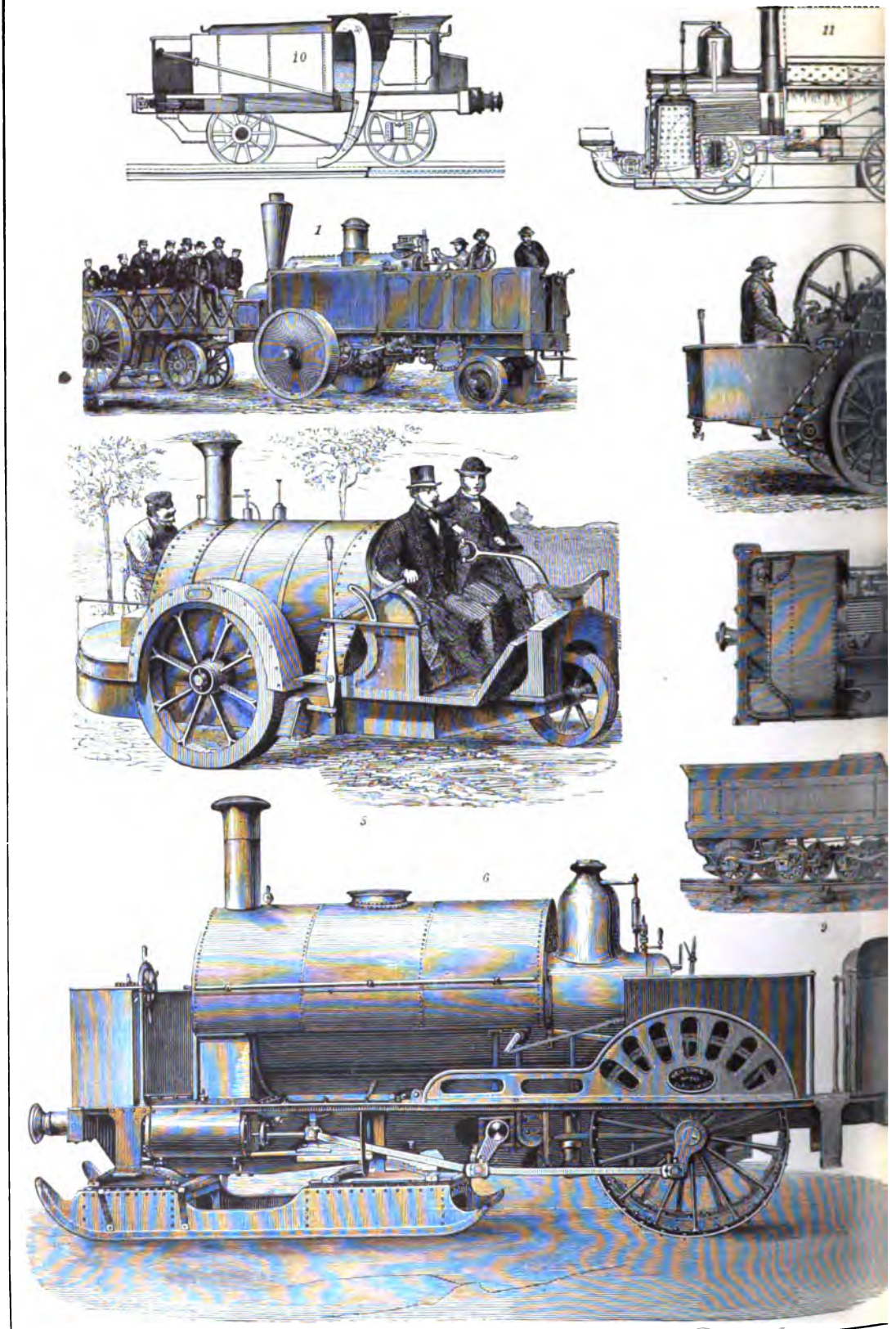

Figs. *1* and *2*, Traction Engines for Streets and Roads. *3*, Street or Road Carriage *4*, Locomotive Crane Engine. 5 (
9, American Tender for Railway Locomotives. *10*, Tender with

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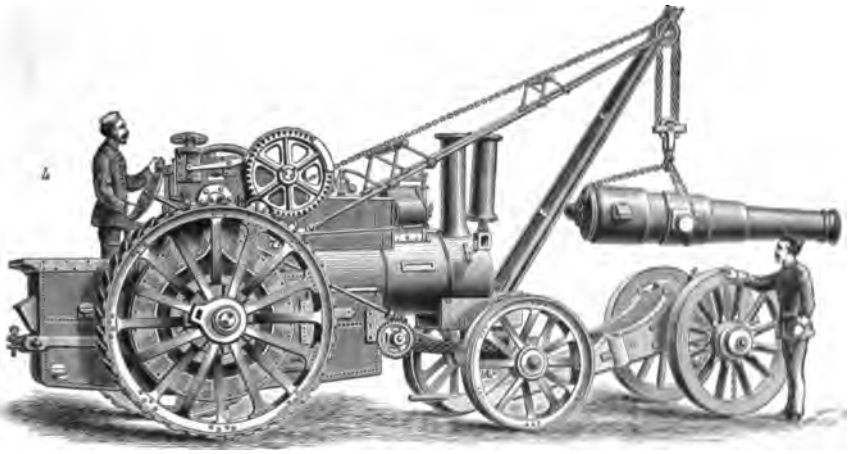

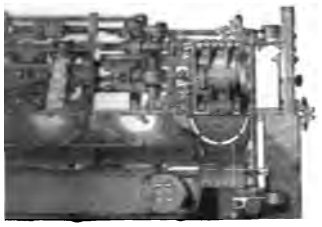

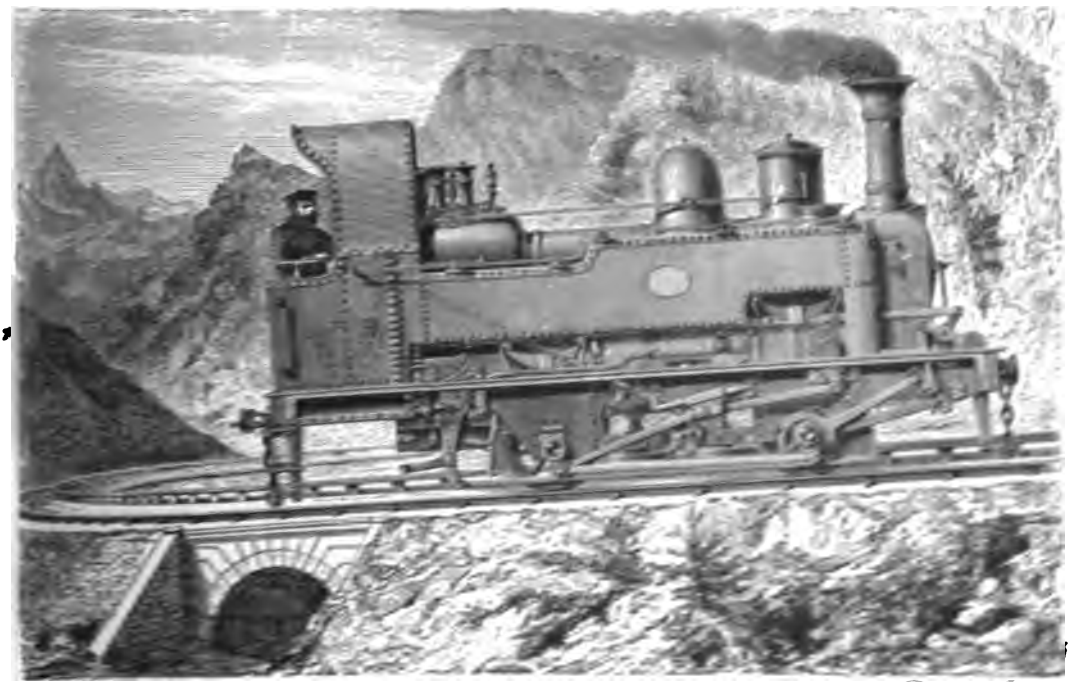

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or supporting ribs of these wings also exhibit a fan-like arrangement in springing from the attached point and radiating towards the circumference of the wing. The metamorphosis is of an imperfect kind, the larvæ and pupæ much resembling the imago or adult form in shape and appearance, and differing simply in size and in the absence of wings, which appear in the pupa, and become fully developed in the imago state. The mouth is eminently adapted for biting, both the mandibles or larger jaws, and the lesser jaws or maxillæ, being of powerful construction. The most celebrated of the tribe is the Migratory Locust (*Locusta migratoria*, or *Acrydium migratorium*) of Southern Asia and Africa, the ravages of which have been noted by man and dreaded by him from the earliest times. Of all animals capable of adding to the calamities of mankind by destroying the vegetable products of the earth, the migratory locusts would seem to possess the most formidable powers of destruction. In Syria, Egypt, and almost all the south of Asia, these insects make their appearance in legions, and carry desolation with them, in a few hours changing the most fertile provinces into barren deserts, and darkening the air by their numbers. Happily for mankind this calamity is not frequently repeated, for it is the inevitable precursor of famine and its horrible consequences. The annals of most of the southern Asiatic climates are filled with the accounts of the devastations produced by locusts. They seldom visit Europe in such swarms, though they are occasionally formidable to the agriculturist. Even when dead they are still productive of evil consequences, since the putrefaction which arises from their inconceivable number is so great that it is justly regarded as the cause of some of those desolating pestilences which almost depopulate whole districts of country. When locusts thus make their appearance they are said to have a leader, whose flight they observe, and to whose motions they pay a strict regard. We are told that nearly as much damage is occasioned by what they touch as by what they devour. Their bite is thought to contaminate the plants, and either to destroy or greatly weaken their vegetation. Of the innumerable multitudes in which they occur scarcely an adequate conception can be formed. Barrow states that in Southern Africa the whole surface of the ground might literally be said to be covered with them for an area of 2000 square miles. The water of a very wide river was scarcely visible on account of the dead carcasses that floated on the surface. When the larvæ (for these are much more voracious than the perfect insects) are on a march during the day it is utterly impossible to turn the direction of the troop, which is generally with the wind. In some parts of the world these insects are used for food. For this purpose they are caught in nets, and when a sufficient number is procured they are roasted over a slow fire in an earthen vessel till the wings and legs drop off; when thus prepared they are said to taste like craw-fish. Adanson says, however, that he would willingly resign whole armies of locusts for the meanest fish. The locusts constituted a common food among the Jews, and Moses has specified the different kinds which they were permitted to eat. 'Even these thou mayest eat; the locust after his kind; the bald locust after his kind; the beetle after his kind; and the grasshopper after his kind' (Levit. xi. 22). In the plain of Bushire they are sold to the peasantry in a dried and salted state. The Arabs eat them ground into a powder and made into cakes of a round shape. In the Mahratta country they are also salted and eaten. The Hottentots eat them, and among the ancient Ethiopians and Parthians they formed articles of diet. Dr. Shaw says that in Barbary he saw them appear about the end of March, and that in April they had increased in vast swarms. In May they returned to the plains to deposit their eggs. The larvæ made their appearance in June, and were arranged in compact bodies, each brood covering a space of ground about a furlong square. These hordes marched onwards in a phalanx, desolating the gardens and fields, and even entering houses on their line of march. And this exodus-like movement continued for days together. In a month they arrived at their full growth, and cast off the pupa or chrysalis skin, and as soon as the wings were dry mounted into the air as the perfect forms. These locusts also are found occasionally in Southern Europe, and have even extended to Britain. The *Locusta cristata* of the Levant is about 4 inches long, and measures between 7 and 8 in the expanse of wings. The Migratory Locust is about 2½ inches in length. The locusts resemble the grasshoppers and crickets in that they produce a chirping sound by rubbing the inside of the thighs on the prominent ribs of the front wings. In America several allied species exist; but the Cicadas, though popularly known as locusts, have no relationship with the Locustina. (See Pl. LXV.–LXVI. fig. 15.)

LOCUST, or ACACIA (*Robinia pseudacacia*, natural order Leguminosæ). This valuable tree, which is so frequently cultivated in the Atlantic States of America, and highly prized in Europe, grows wild in great profusion among the Alleghany Mountains and throughout the Western States, even to the borders of the sandy plains which skirt the base of the Rocky Mountains. When in bloom the large pendulous racemes of fragrant white flowers, contrasting with the light-green foliage, produce a fine effect, and give this tree a rank among the most ornamental. The leaves are pinnate, and the leaflets very thin and smooth. The flowers, resembling in form those of the pea, diffuse a delicious perfume, and are succeeded by a flat pod. The branches and young stems are usually armed with thorns. The wood is compact, hard, capable of receiving a fine polish, and has the valuable property of resisting decay longer than almost any other. The colour is greenish yellow with brown streaks. Locust-posts are consumed in enormous quantities, and are everywhere preferred when they can be obtained. This wood is also very much employed in ship-building in the upper and lower parts of the frame, together with the white and live oaks and red cedar; but it is difficult in the Atlantic ports to procure stocks of sufficient dimensions. For tree-nails it is preferred to all other kinds of wood, as it acquires extreme hardness with age, and considerable quantities of these are annually exported to Great Britain. It is also employed by turners, and from its fine grain and lustre forms a very good substitute for box. The locust grows very rapidly, but when cultivated in the Atlantic States it is found to be liable to the attacks of an insect, which, by boring into the wood in various directions, weakens the tree so much that it is easily broken by the wind. In various parts of Europe great attention has been paid to the propagation of this tree, for ornament as well as for its useful properties, and its cultivation is further encouraged by the absence of the destroying insect above mentioned. It forms a pleasing object along the borders of many of the railways on the Continent. The usual stature of the locust is 40 or 45 feet, but in the fertile regions of the south-west it attains much greater dimensions, sometimes reaching to the height of 80 feet, with a trunk 4 feet in diameter. The genus is peculiar to North America.

The *R. viscosa*, a smaller tree than the locust, from which it is distinguished by its rose-coloured flowers,

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and by having the young branches covered with a viscous substance, is in its natural state confined to the south-western parts of the Alleghany Mountains. It usually does not exceed 40 feet in height, with a trunk 12 inches in diameter, and is a more ornamental tree than even the preceding. The properties of the wood are very similar to those of the common species, and it will bear cultivation in the same climates.

The *R. hispida* is also a native of the south-west ranges of the Alleghanies. It is a shrub with very hispid branches, often cultivated in gardens on account of its very large and beautiful rose-coloured flowers, which, however, like those of the *R. viscosa*, are inodorous.

LODGERS, tenants of part of a house holding from the occupier of the whole house. In most respects a lodger has exactly the same relation to the occupier of a whole house as the tenant of a house has to his landlord, but a weekly lodger is not liable to the double rent or double value which by the law of England a tenant is required to pay for holding over, that is, for continuing to occupy any land or property which he holds in lease beyond the date at which he has given notice of his intention to leave or has received notice to quit from the landlord. If lodgings are taken by the week a week's notice is all that is necessary on either side before the lodger leaves or is required to leave; and so if they are taken by the month or quarter, only a month's or quarter's notice is required. If a tenant quit without giving notice the landlord may recover the rent, even though he has put up a notice in the window that the rooms are to let, or has lighted fires in the rooms; but if he has let the rooms to another tenant the first tenant is not liable for the rent of the rooms for any period subsequent to the re-letting of the rooms. If the rooms let to a lodger are not kept in a proper state of cleanliness, the lodger may leave immediately without giving notice. Formerly in England lodgers' goods were liable to be distrained by the landlord of the house if the tenant from whom they held the lodgings were in arrears with his rent; but the law on this point has been altered by 34 and 35 Vict. (1871) cap. lxxix. This act provides that in case of distress being levied by the superior of the whole house on any property belonging to a lodger, such lodger may certify in writing to such superior, or any person employed by him to levy the distress, that the tenant in arrear has no interest in the property so distrained. Such a declaration must be accompanied by a statement of the amount of rent, if any, then due by the lodger to the tenant in arrear, and by an inventory of all the property referred to in the declaration. The lodger may then pay the superior of the whole house the sum due by him to his immediate landlord, or as much as is necessary to discharge the claim made by the superior of the whole house, and such payment is to be held as discharging, to the amount paid, the debt due by the lodger to his immediate landlord just as if it had been paid to himself. If after such a declaration has been made by a lodger to a superior landlord, the latter continue the distress, such distress is to be held illegal, and the lodger may obtain relief by an action at law against the landlord so distraining. In Scotland the landlord's right of hypothec, which corresponds in many respects to the right of distress in English law, at no time extended to lodgers' goods. Formerly lodgers had no recognized right to the electoral franchise, although in Scotland it was the practice for the sheriffs to enrol as voters lodgers who paid yearly rent for rooms, exclusive of board, to the amount of at least £10; but the Representation of the People Acts of 1867 and 1868 have fixed a uniform lodger franchise for all the three countries of the United Kingdom. By the provisions of these acts any male lodger of full age who has occupied rooms for a year continuously previous to the last day of July in any year in the same house, and has paid for such rooms, if unfurnished, a yearly rent of at least £10, or if furnished, a rent equivalent to one of £10 or more for unfurnished lodgings, may have himself registered as a voter for that year; but if his right to vote is to continue his claim must be renewed every year. With regard to the estimation of the rent of furnished lodgings, the usual practice is to reckon such rent as double that which would be paid for the same lodgings unfurnished. Housekeepers who let rooms to lodgers are not, like innkeepers, liable for the safety of their lodgers' goods. Formerly it was held in Scotland that they were so liable, but there has been no recent decision to confirm the old precedent.

LODGING-HOUSES. Two classes of lodging-houses have been dealt with by Parliament. One of these is lodging-houses for the labouring classes, which form the subject of an act passed in 1851 (14 and 15 Vict. cap. xxxiv.) This act empowers any borough, parish, or local board of health which adopts it to raise money and appoint commissioners for the purposes of the statute, to appropriate, purchase, or rent lands to build lodging-houses thereon, and to purchase or lease lodging-houses already in existence, with the view of providing accommodation for the labouring classes. The management of all lodging-houses, built, purchased, or leased under this act is to be confided to the commissioners of the town council of the borough, the local board of health, or the parish, as the case may be. Such lodging-houses, if within the district of a local board of health, are to be at all times open to the inspection of the board or their officers. Any person receiving parochial relief, and any person whose wife or husband receives such relief, is disqualified from being either tenant or occupier of a lodging-house established under this act.

The other class of lodging-houses dealt with by Parliament are common lodging-houses, in which poor people lodge for the night. These are regulated by Acts 14 and 15 Vict. cap. xxviii. (1851), and 16 and 17 Vict. cap. xli. (1853). By these statutes it is enacted that all such lodging-houses must be registered in the borough or district in which they are situated, and that this register must contain a description of the situation of the lodging-house, with a statement of the number of lodgers authorized by these acts to be received in it. The keeper of a common lodging-house is required, when any person received in it is attacked with fever or any infectious or contagious disease, to give immediate notice to the proper authority, who is empowered under the sanction of proper medical certificates to have the patient removed to the infirmary, and to take any measures that he may deem necessary to prevent the spread of infection. Common lodging-houses of this nature must always be open to the inspection of the officer appointed for the purpose, and upon his order, or when required by any regulation or by-law, are to be thoroughly cleansed in all their parts.

LODI, a town in Italy, Lombardy, in the province of Milan, in a fertile plain on a gentle height above the right bank of the Adda, here crossed by a wooden bridge, 18 miles south-east of Milan. The principal buildings are the duomo or cathedral, a Gothic structure of the twelfth century, of limited dimensions, but very pure in its style of architecture; the church of the Incoronata, in the form of an octagon, after an elegant design by Giovanni Battuggio, a native architect; the town-house, a simple but handsome

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building; the episcopal palace, the Barni and Merlini palaces. The manufactures consist of majolica and delftware; refined wax, saltpetre, and chemical products. The great article of trade is Parmesan cheese, which, though it takes its name from Parma, from which it was first exported, is almost wholly made in the district around Lodi, and employs the milk of more than 30,000 cows. Another kind of cheese, of a more delicate flavour, called *stracchino*, is also largely made in the neighbourhood. The town was entered by Napoleon after the famous passage of the Bridge of Lodi effected against the Austrians on the 10th of May, 1796. Pop. 18,689.

LODZ (Russian, *Lodsi*), a town in Russian Poland, in the circle of the same name, in the government of Petrokov, 76 miles south-west of Warsaw, and next to it the most populous town in Poland. It is the terminus of a branch line from the Warsaw and Vienna Railway, and has made great advances in recent times through the activity of its trade and the flourishing state of its manufactures, especially that of woollens, which is carried on very extensively. A great many of the inhabitants are Germans, or of German origin. A real-gymnasium was opened here in 1866. Pop. 57,000.

LOFODDEN, or LOFOTEN, a group of islands off the north-west coast of Norway, and stretching south-west to north-east about 175 miles. The largest are Andoen, Langoen, Hindoen, East and West Vaagen, and Flagstadöe. They have almost all bold, precipitous, rugged, and deeply-indented coasts, and an elevated and very sterile interior, several of them containing mountains which, though not very lofty, are covered with perpetual snow. The chief value of the group is derived from the immense shoals of cod and herring which frequent them, and the extensive and valuable fisheries which are consequently carried on at the proper seasons. In January fishermen from all parts of the coast, from Finmark, Trondhjem, and Bergen, assemble by thousands and take up their stations along the islands to await the fish which set in from the ocean in the beginning of February, and occupy the banks of the West Fiord, a large arm of the sea extending between the chain of islands and the mainland. In ordinary years about 4000 boats, each manned by five hands, or 20,000 in all, are employed; and the produce in cod is about 10,000 tons dried fish, 25,000 barrels of oil, and 7000 barrels cod-roe. The principal cod-fishery ends in April, but the herring-fishery continues, and furnishes an important branch of national revenue. The celebrated whirlpool, the Maelstrom, is situated at the southern extremity of these islands. Permanent population of group, about 4000.

LOG, a machine used to measure the rate of a ship's velocity through the water. For this purpose there are several inventions, but the one most generally used is the following, called the *common log*. It is a piece of thin board, forming the quadrant of a circle of about 6 inches radius, and balanced by a small plate of lead, nailed on the circular part, so as to swim perpendicularly in the water, with the greater part immersed. The log-line is fastened to the log by means of two legs, one of which is knotted, through a hole at one corner, while the other is attached to a pin fixed in a hole at the other corner, so as to draw out when sufficient force is exerted on it. The log-line, being divided by means of knots of coloured cloth into certain lengths, which are in proportion to an equal number of geographical miles, as a half or quarter minute is to an hour of time, is wound about a reel. The whole is employed to measure the ship's head-way in the following manner:—The reel being held by one man, and the half-minute glass by another, the mate of the watch fixes the pin and throws the log over the stern, which, swimming perpendicularly, feels an immediate resistance, and is considered as fixed, the line being slackened over the stern to prevent the pin coming out. The knots are measured from a mark on the line at the distance of twelve or fifteen fathoms from the log. The part of the line between the log and this mark is called the stray-line. The glass is turned at the instant that the mark passes over the stern, and as soon as the sand in the glass has run out the line is stopped. The water then pressing on the log dislodges the pin, so that the board, now presenting only its edge to the water, is easily drawn aboard. The number of knots and fathoms which had run off at the expiration of the glass determines the ship's velocity. The half-minute glass and divisions on the line should be frequently measured, to determine any variation in either of them, and to make allowance accordingly. If the glass runs thirty seconds the distance between the knots should be 50·725 feet. As the heat or moisture of the weather has often a considerable effect on the glass, so as to make it run slower or faster, it should be frequently tried by the vibration of a pendulum. As many accidents attend a ship during a day's sailing, such as the variableness of winds, the different quantity of sail carried, &c, it will be necessary to heave the log at every alteration, and even if no alteration be perceptible yet it ought to be constantly heaved. The inventor of this simple but valuable device is not known, and no mention of it occurs till the year 1577, when it is described by William Bourne. Several improved logs have been invented, most of them rather complicated, with apparatus for indicating the change of direction and other circumstances relating to a ship's course.

LOG. See LOG-BOOK.

LOGARITHMIC CURVE, a mathematical curve discovered by Gregory; it is the locus of a point such that its distance from a line is in a constant ratio to the logarithm of its distance from another line at right angles to the first. Its equation is $y = a^x$.

The logarithmic or equiangular *spiral* is a curve which cuts all the lines drawn from a certain point at the same angle. Its equation is $\rho = a^\theta$. Professor Tait has shown that when a pendulum swings in a resisting medium, or whenever a body moves in a straight line under the influence of a force which varies as the distance of the body from a fixed point, and when at the same time there is a resistance to its motion which is proportional to its velocity, the motion of the body is the same as the projection on a straight line of uniform motion in an equiangular spiral. The vibrations of such a body are not isochronous. Tait has shown how, when the times of a few consecutive swings are known, to calculate the time of vibration on the supposition that there is no resistance offered to the vibratory motion. Professor Clerk Maxwell made use of this in his experiments on the viscosity of gases.

LOGARITHMS. The common logarithm of a number is the index of the power to which 10 must be raised to be equal to the number. Thus $10^3 = 1000$, so that the logarithm of 1000 (usually written log. 1000) is 3. Now $10^1 = 10$, $10^2 = 100$, $10^3 = 1000$, $10^6 = 1{,}000{,}000$, and it is well known that $10^0 = 1$, $10^{-1} = 0{\cdot}1$, $10^{-2} = 0{\cdot}01$, &c., thus—

Log. 0·001	= −3	Log. 10	= 1
Log. 0·01	= −2	Log. 100	= 2
Log. 0·1	= −1	Log. 1000	= 3
Log. 1	= 0	Log. 10,000	= 4

It is evident that the logarithm of any number greater than 1 and less than 10 is fractional; the logarithm of any number greater than 10 and less than 100 is greater than 1 and less than 2. Again,

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the logarithm of any number less than 1 is negative. The logarithms of numbers have been calculated by Napier, Briggs, Mercator, Newton, Leibnitz, Halley, Euler, L'Huillier, Vlacq, Sherwin, Gardner, Hutton, Taylor, Callet, and others. Koralek's ingenious method of computation to seven places of decimals is interesting to students; it is described in Galbraith's Algebra. Chambers' Mathematical Tables is a useful little treatise; it gives logarithms of numbers to seven places of decimals. Suppose we wish to know the logarithm of the number 18·1. In a book of tables we only find the fractional part of the logarithm, it is ·257679. Now 18·1 is greater than 10 and less than 100, so that its logarithm is greater than 1 and less than 2; hence log. 18·1 = 1·257679. We give examples:—

Log. 18100 = 4·257679	Log. 1·81 = 0·257679
Log. 1810 = 3·257679	Log. 0·181 = $\bar{1}$·257679
Log. 181 = 2·257670	Log. 0·0181 = $\bar{2}$·257679
Log. 18·1 = 1·257679	Log. 0·00181 = $\bar{3}$·257679

3·257679 means − 3 + 0·257679. For a full explanation of the finding of logarithms and natural numbers by the tables see the treatise just mentioned. The integral part of a logarithm is called its *characteristic*, the fractional part its *mantissa*. Logarithms make arithmetical computations more easy, for by means of a table of them the operations of multiplication, division, involution or the finding of powers, and evolution or the finding of roots, are changed to those of addition, subtraction, multiplication, and division respectively. For instance, if x and y are the logarithms of any two numbers, the numbers are 10^x and 10^y; now the product of these numbers is 10^{x+y}, so that the logarithm of the product of two numbers is the sum of the logarithms of the numbers. Again, the quotient of the numbers is 10^{x-y}; so that the logarithm of the quotient of two numbers is the difference of the logarithms of the numbers. Again, 10^x raised to the nth power is 10^{nx}; so that the logarithm of the nth power of a number is n times the logarithm of the number. Again, the nth root of 10^x is $10^{\frac{x}{n}}$; so that the logarithm of the nth root of a number is $\frac{1}{n}$th of the logarithm of the number. Hitherto we have spoken of common logarithms, which were invented by Briggs; their *base*, as it is called, is 10. Now logarithms were first used by Napier of Merchiston (see NAPIER, JOHN), and he employed a base which is smaller than 10, it is the number 2·7182818... .., or the sum of the infinite series $2+\frac{1}{2}+\frac{1}{2\cdot3}+\frac{1}{2\cdot3\cdot4}+$ &c. This base is denoted by ϵ in mathematical treatises, and the *Napierian* logarithm of any number, say 7, is $\log_\epsilon 7$, to distinguish it from log. 7, which is the common logarithm, whose base is 10. The common logarithm of a number is found from the Napierian by multiplying by 0·43429448. Napierian logarithms are of great importance in mathematics.

LOG-BOOK, a book into which the contents of the log-board are daily transcribed at noon, together with every circumstance deserving notice that may happen to the ship or within her cognizance, either at sea or in a harbour, &c. The entries required to be made by the Merchant Shipping Act of 1854 are convictions, offences, punishments, conduct of crew, illnesses and injuries, deaths, births, and marriages, quitting the ship, wages of men entering the navy, wages of deceased seamen, sale of deceased seamen's effects, and collisions. The log-book must be signed by master and mate, and certain other persons in particular cases.

LOGGIA, a word used in Italian architecture with several significations. First, it is applied to a hall open on two or more sides, where there are pillars to support the roof. Such are the Loggia de' Banchi in Genoa, and the Loggia de' Lanzi in Florence. It is also applied to an open colonnade along the side of a building, as in the case of the so-called Logge di Raffaelle at the Vatican, where the colonnade surrounds the court of San Damaso, and the inner walls of the logge are adorned with beautiful paintings begun by Bramante under Pope Julius II., and completed after the designs of Raffael under Leo X. The name loggia is also given to the large ornamental window consisting of several parts which is often seen in old Venetian palaces; and lastly, it is used to designate a small airy hall, usually open on all sides, constructed on the roof of an edifice.

LOGIC. Logic has been variously defined, but all writers on the subject agree in holding that the main subject of which it treats is reasoning, together with the operations of the mind subsidiary to reasoning, and that its chief end is to ascertain the principles on which all valid reasoning depends, and which may therefore be applied as tests of the legitimacy of every conclusion that is drawn from premises. Thus Whately defines logic as 'the science and art of reasoning,' and Whewell says that 'by logic has generally been meant a system which teaches us so to arrange our reasonings that their truth or falsehood shall be evident in their form.' Hamilton defines it as 'the science of the laws of thought as thought,' by which he means to indicate that it is not concerned about reasoning alone, but also about those elements of thought (judgments and concepts) that enter into all reasonings, and in each case not about what he calls the *matter* of any mental product, that is to say, not about the subject or content of particular reasonings, judgments, &c., but about the *form*, or what is common to all reasonings, judgments, and concepts respectively. Some logicians would extend the sphere of logic further than is consistent with any of the definitions just given, and make it coextensive with the science or theory of evidence in the most general sense of that term; but we shall be following the most general usage if we confine it to the study and estimation of such evidence as depends for its sufficiency more or less immediately on some admitted truth which is at least equally general in its nature with that which it is held to prove.

DIVISIONS.—Logic has been divided, according to different principles, into objective and subjective (*Logica systematica* and *Logica habitualis*); into abstract or general and concrete or special (*Logica docens* and *Logica utens*); into pure and modified; and into deductive and inductive. The first of these divisions looks at logic, on the one hand, as a systematized body of truths on the subject of which it treats, and, on the other hand, as the knowledge of these truths which is possessed by an individual, and the ability which that individual displays in applying them. The second division, into abstract and concrete, considers logic in the first case apart from any of its particular applications, and in the second case as applied to some particular art or science. The division into pure and modified logic looks at that science first in its naked theory, and secondly as modified in its application to the search after truth by the mental constitution of man generally or particular individuals; or, in other words, pure logic treats of the laws of correct reasoning and what is connected therewith, and modified logic treats of those circumstances that are likely to lead men into error in reasoning. In all these divisions it will be seen that what is looked to in the first instance is the true science of logic considered in itself, and what is looked to in the second instance is that science in its relation to something else which is not logic at all.

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The fourth division of logic above mentioned, into deductive and inductive, is one of more importance, and leads to two different branches of inquiry, but it may be questioned, as will afterwards be seen, whether even it can properly be regarded as a division of logic. The distinction made between these two kinds of logic (so-called) is that the first, deductive logic, deals with reasoning from generals to particulars, while inductive logic deals with the processes of inference by which from an investigation of nature we arrive at general truths with regard to the phenomena of nature. The inclusion of this section of study within the sphere of logic may perhaps seem inconsistent with the limitation which we have already put upon that sphere, in excluding from it all inference which is not derived ultimately from some truth more general than that which is inferred, but when we come to treat of this section it will be found that this is in reality not the case, at least according to the view which is taken of induction by the most systematic expositor of the theory of inductive logic. Whatever reasons there may be for hesitating to consider the logic of deduction and the logic of induction as strictly speaking two species of that science, an article upon logic, as the term is very generally applied, would scarcely be complete if it did not treat of the subject in both the sections indicated, and we will accordingly here give a short summary of the received exposition, first of deductive, or as it is also called, syllogistic or pure formal logic, or the logic of ratiocination, including what has been called traductive logic, which considers that species of reasoning in which the conclusion is neither more nor less general than the premises; and, secondly, of the logic of induction.

Deductive Logic.—As we have already said, it is the function of logic to treat not only of reasoning, but also of the operations of the understanding subsidiary to reasoning. Reasonings come under the examination of logic only as they are expressed in words; thus only can they appear in such a form that their truth or falsehood will be instantly evident, according to the requirements of Whewell's definition of the science. As expressed in words reasonings are composed of judgments or propositions, and judgments are composed of terms, general or particular. Naming and judging are therefore two operations of the understanding, and names and propositions two mental products which, as subsidiary to reasoning, belong to the province of logic.

Laws of Thought.—But before saying anything of these subsidiary operations it is necessary to state the three axioms or fundamental laws of thought which regulate the understanding in all its operations whether of naming, judging, or reasoning, and which are in themselves self-evident. These are, 1, the law of identity; 2, the law of contradiction or difference; and 3, the law of excluded middle. The law of identity expresses the fact that everything is the same as itself: its formula is A is A. The law of contradiction or difference expresses the fact that nothing can be the same as its contradictory: its formula is A is not Not-A. The law of excluded middle expresses the fact that one or other of two contradictory propositions must be true: it asserts the truth of the formula A is either B or not B. Applying these laws to naming then we can affirm that every name must be the same as itself; that no name can be thought as expressing contradictory attributes; that no name, for example, is thinkable as expressing at once the attributes of rationality and irrationality; and that of every name we can assert that any attribute either is or is not expressed by it. To these laws some writers add the law of reason and consequent, expressed by the formula, Infer nothing without a reason.

Names or Terms.—It would be impossible without extending the length of this article disproportionately to go very minutely into the theory of naming. It is enough to mention that names are applied to persons or things, either in virtue of certain attributes which they possess, or merely in order to distinguish one individual from another. The former have been aptly called connotative, because they connote (mark together) or express the attributes which constitute their meaning, and they may be applicable either to single individuals (as God, the sun), or to numbers of individuals (as man, horse). The latter are called non-connotative, and are applicable only to single individuals, or if applied to more than one individual, are not applied in virtue of any qualities that these may happen to possess in common. The attributes expressed by a name are called its connotation, and the individuals to which it is applicable its denotation. Some writers, instead of the connotation and denotation of a name, speak of the comprehension and extension of a concept, which is the sum of the qualities expressed by a name. The comprehension of a concept is thus these qualities considered in themselves, and the extension the aggregate of individuals in which these qualities are found to exist. See Definition.

Judgments.—Judgments or propositions are the forms in which our beliefs are expressed in language. In them we either affirm or deny something to be true of something else. The term expressing that of which the assertion is made is called the subject; that which expresses what is denied or affirmed of the other is called the predicate. Sometimes there is a separate word or phrase to connect the subject and predicate, and to show whether the latter is affirmed or denied of the former. This is called the copula ('is' or 'is not,' or 'are' or 'are not'), but there is no necessity for its being separately expressed. It is the function of the part of speech called a verb at once to express what is affirmed or denied of a subject, and to indicate (with or without some negative particle, as the case may be) whether the proposition is one of affirmation or negation. Every proposition may, however, be analyzed into subject, predicate, and copula, if not already expressed in that form; and in logical treatises this is usually done: the proposition, 'Merit deserves reward,' for example, is resolved into 'Merit is deserving of reward.'

Distribution and Quantity.—The terms of a proposition are said to be distributed when they are used with reference to all the things which they denote, and undistributed when used with reference to only some of the things which they denote. In the case of the subject there is usually some word or phrase (such as all, every, in every case, no, some, &c.) to indicate whether it is distributed or not; in the case of the predicate this is commonly indicated by the nature of the proposition. In all negative propositions the predicate is distributed, and in all affirmative propositions it is taken to be undistributed unless the predicate is of such a nature as to be applicable to only one subject, as when we say, 'Power was the only end of his existence;' where the predicate 'the only end of his existence' can only be asserted of a single subject. We may illustrate the distribution and non-distribution of the terms of a proposition by propositions expressed in the forms All A's are B, and No C is D. In the first of these the word 'all' shows that the subject is distributed; B is affirmed of everything that is A. The predicate, on the other hand, must be taken to be undistributed, because there is nothing in the nature of the proposition to show whether or not there are some things which are B in addition to those which are A. In the second of the proposi-

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tional forms above given, the 'no' shows that the subject is distributed, that the predicate is denied of all the things that are C, and the negative character of the proposition shows that everything that is D is denied of C. The words all, some, &c., showing whether the subject of a proposition is distributed or not, are said to indicate the *quantity* of the proposition. Sir W. Hamilton advanced the theory that in every proposition the predicate should have a sign of quantity as well as the subject, so that every proposition should be a perfect equation. This is what is called the doctrine of the quantification of the predicate, but it has not been generally received into the expositions of deductive logic, and has been positively objected to by some logicians as involving a misrepresentation of the nature of a proposition. (See QUANTIFICATION OF THE PREDICATE.) Propositions the subject of which is distributed are called *universal* or *singular* according as the subject is applicable to more than one or to only one individual; those of which it is undistributed, *particular*. When there is no sign to indicate whether the subject is distributed or not, the proposition is called *indefinite*, in place of which Sir William Hamilton introduced the term *preindesignate*, applying the term *predesignate* to those in which the quantity was overtly expressed.

Quality.—As judgments are said to differ in quantity according to the distribution or non-distribution of their subject, so they are said to differ in *quality* according as they are affirmative or negative; and with reference to both quality and quantity they are divided into four classes—universal (or singular) affirmative, represented by the vowel A; universal negative, represented by E; particular affirmative, represented by I; and particular negative, represented by O. Examples of the four are:—All men are liable to err; No man is the exact counterpart of another; Some men are wise; Some men are not wise.

Conditional Judgments.—Hitherto we have only treated of what are called categorical propositions, that is, those in which something is directly affirmed or denied of the subject; but there is another class in which the predication is not direct. Of such propositions there are three kinds, hypothetical, disjunctive, and hypothetico-disjunctive or dilemmatic. *Hypothetical* propositions are such as have a condition attached to the predicate, as, If A is B, C is D, or if A is B, it is C. The condition is called the *antecedent*, and the proposition whose truth depends upon the condition is called the *consequent*. *Disjunctive* propositions are such as in effect, though not in form, affirm the truth of one of two or more propositions, such as Either A is B, or C is D, or again A is either B or C or D, the first of which is equivalent to One of the two propositions A is B, C is D is true; and the second to One of the propositions A is B, A is C, A is D is true. Such propositions are often treated by logicians as if the alternative excluded the possibility of more than one of the propositions being true. The first of the examples given would, according to this rule, be considered as equivalent to, One, and only one, of the propositions A is B, C is D is true; and the second to, One, and only one, of the propositions A is B, A is C, A is D is true. But this is quite an uncalled for limitation of the meaning of the phrase disjunctive proposition, and leaves one form of proposition without a name; for judgments in which we assert that at least one of two or more alternatives is true, are often made without the intention of excluding the possibility of more than one

ight be said, for example, of a man
reat sums of money on projects
, that he must either be very
sh, without meaning to state
both very wealthy and very

foolish. Indeed, it would be more proper to regard the latter sense as the true meaning of a disjunctive proposition, inasmuch as that expresses all that is necessarily implied in a proposition of that form. The last kind of indirect proposition, the *hypothetico-disjunctive* or *dilemmatic* is a compound of both the other two, in some such form as, If A is B, C is either D or E. As a hypothetical proposition affirms (or denies) some predicate of some subject conditionally, a hypothetico-disjunctive proposition affirms (or denies) the truth of one or other of two or more propositions conditionally.

Immediate Inference.—Before we pass from judgments to reasonings, or the doctrine of syllogisms, we have to consider four methods of treating propositions, so as to derive other propositions, the truth or falsity of which is implied in the original propositions. These methods are called processes of immediate inference.

1. Contraposition.—The first of these processes is called *contraposition*. It consists in changing the original proposition (called the contraponend) into another (called the contraposita), by substituting a negative copula for an affirmative one, or an affirmative for a negative one, and taking instead of the original predicate its contradictory. Thus, the proposition, All men are mortal, becomes by contraposition, No man is immortal.

2. Subalternation.—The second process is through the relation of *subalternation*. This relation subsists between universal propositions, whether affirmative or negative, and their corresponding particulars, or between A and I, and between E and O, when the terms of the propositions are otherwise the same. A and E are called *subalternants* with reference to I and O respectively, and I and O are called with reference to them *subalternates*. If a subalternant is true, the subalternate must also be true. If the subalternate is false, the subalternant must also be false. If it is true that All A's are B, it must be true that Some A's are B; if it is not true that Some A's are B, it cannot be true that All A's are B. Nothing can be inferred from the fact of a subalternant being false, or a subalternate being true. These propositions are so manifestly true that they need not be dwelt upon, and would not require even to be stated, were it not for the sake of giving formal completeness to the theory of logic.

3. Opposition.—The third process of immediate inference is of somewhat more importance. It depends upon the doctrine of *opposition*. All the four possible forms of propositions taken two together form six pairs, AE, AI, AO, EI, EO, and IO. We have just seen that the members of two of these pairs, AI and EO, stand to one another (when the terms are otherwise the same) in the relation of subalternation. The members of the remaining four, AE, AO, EI, and IO, stand to one another (under the same condition) in the relation of opposition. When the two propositions in any pair differ both in quantity and quality the opposition is called *contradictory*. A and O, and E and I are accordingly contradictories. The two universal propositions A and E are said to stand to one another in *contrary*, and the two particulars I and O in *sub-contrary*, opposition. The laws of immediate inference bearing upon propositions standing to one another in the relation of opposition are the following:—1. Of two contradictory propositions one must be true, and the other false. If it is true that All A's are B, it must be false that Some A's are not B; if it is false that Some A's are B, it must be true that No A is B. 2. Two contrary propositions may both be false, but they cannot both be true. If it is false that All A's are B, it may nevertheless be equally false that No A is B; but if it is true that

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All A's are B, it must be false that No A is B; and if it is true that No A is B, it must be false that All A's are B. 3. Two sub-contrary propositions may both be true, but they cannot both be false. If it is true that Some A's are B, it may be none the less true that Some A's are not B; but if it is false that Some A's are B, it cannot be false that Some A's are not B.

4. Conversion.—The last process of immediate inference is also important, especially on account of the part it plays in the theory of the syllogism as usually expounded. It is called *conversion*, and is of three kinds, simple conversion, conversion *per accidens*, or by limitation, and conversion by contraposition. In every kind of conversion the proposition in its original form is called the *convertend*, and the proposition into which it is changed the *conversa* or *converse*. The law of conversion is that no term must be distributed in the converse which was not distributed in the convertend. Simple conversion is effected by a mere transposition of the terms of the convertend. It is applicable to propositions in E in which both terms are distributed, and to propositions in I in which neither is distributed. Thus, No A is B becomes by simple conversion No B is A; and Some A's are B becomes Some B's are A. Conversion *per accidens* or by limitation is applicable to A, in which the subject is distributed and the predicate undistributed, and is effected by transposing the terms, and limiting the quantity of the proposition from universal to particular. Thus, All A's are B becomes by conversion *per accidens* Some B's are A. These are the only two species of direct conversion, conversion by contraposition being a double process, in which instead of the convertend its contraposita is taken, and this contraposita is then simply converted. It is thus in reality a process of simple conversion, preceded by another process different from conversion. Although applicable to A, E, and O this process is in practice applied only to the last, as being the only one for which it is required. Some A's are not B's thus becomes, in the first place, Some A's are Not-B's, and then Some Not-B's are A's. All these laws of immediate inference are so evident as to require no proof. None of them could be violated without a direct violation of the fundamental laws of thought. It may be remarked incidentally that one of the results of the adoption of the doctrine of the quantification of the predicate would be to change all conversion into simple conversion. The proposition All A's are B would with a quantified predicate be expressed as All A's are all B's, or All A's are some B's; the former of which would be converted into All B's are all A's, and the latter into Some B's are all A's.

Ratiocination.—We now come to that which forms the main subject of deductive logic, the theory of ratiocination, or the syllogism. All deductive reasonings, or reasonings from generals to particulars, must necessarily be capable of being stated in the form of a syllogism, and on being so stated their validity will be evident from their form. A *syllogism* consists of three propositions, two of which, called collectively the *antecedent*, and separately the *premises*, state the grounds of the inference deduced; while the third, called the *consequent* or *conclusion*, states what that inference is. Every syllogism consists of three terms, each of which occurs twice. Of these one occurs twice in the antecedent, once in each premise, and is called the *middle term*. The other two occur once in the antecedent, and once in the consequent. That which is the subject of the consequent is called the *minor term*, and that which is the predicate the *major term*. Both together are sometimes called the *extremes*. The premise containing the major term is called the *major premise* (by Sir W. Hamilton the *sumption*). That containing the minor term is called the *minor premise* (by Sir W. Hamilton the *subsumption*). It is a matter of no consequence to the validity of a syllogism in what order the propositions are given; but in logical treatises the usual order is 1st, major premise, 2d, minor premise, 3d, conclusion; and all logical formulas referring to the syllogism, are based on the assumption that its parts are so stated.

Figure.—The syllogism may appear in four different forms, called *figures*, according to the position of the middle term, which may be subject in the major premise and predicate in the minor, predicate in both premises, subject in both premises, or predicate in major and subject in minor. These figures are known as first, second, third, and fourth, and are usually represented by the following scheme, in which P (predicate of conclusion) stands for the major term, S (subject of conclusion) for the minor, and M for the middle:—

	Fig. 1.	Fig. 2.	Fig. 3.	Fig. 4.
Major premise.....	M P	P M	M P	P M
Minor premise.....	S M	S M	M S	M S
Conclusion.....	S P	S P	S P	S P

The Ground of Validity of Syllogistic Reasoning.—Logicians commonly base the validity of the syllogistic process upon some form of the canon, called the *Dictum de omni et nullo*, which in its Latin form reads thus—*Quicquid de omni valet, valet etiam de quibusdam et singulis: quicquid de nullo valet, valet nec de quibusdam nec de singulis;* which may be interpreted in English thus: 'Whatever is true of a whole class, is true of what is included in that class.' It is evident, however, that this canon is not directly applicable to any figure except the first. In it alone do we first assert that something (P) is true of a class (M), and that something else (S) belongs to that class, and then conclude that what is said to be true of the class is true also of that included in the class. Some logicians accordingly give canons applicable to all syllogisms, as the ground of the legitimacy of the conclusions drawn; while others hold the first figure to be pre-eminent above all the others, and give rules for applying the test of the *dictum de omni et nullo* to all figures, by the conversion of syllogisms in the last three figures into corresponding syllogisms in the first. Sir W. Hamilton holds that the first figure is the only natural and regular figure, or rather not a figure at all, but the one natural form of ratiocination; and that the three last figures do not adequately represent the processes of the mind in reasoning, that the ostensible premises (in the fourth figure also the ostensible conclusion) are not the real premises and conclusion; but that the latter are supplied by the mind, and are in general conversive inferences which we are entitled to make. This doctrine is, however, the same in substance with the common one, these real premises supplied by the mind being the same as the premises substituted for the original ones, in reducing according to the rules of logicians a syllogism in the second, third, or fourth figure to an equivalent syllogism in the first. Before giving these rules for reduction, it is necessary to consider another division of syllogisms, namely, that of those of each figure into moods.

Mood: Syllogistic Rules.—We have already seen that what determines the figure of a syllogism is the position of the middle term. Another division of syllogisms is determined by the quantity and quality of the propositions of which they are composed. If the four propositions A E I O be taken three together in different order there will be sixty-four sets, and if all these sets made legitimate syllogisms there would be sixty-four moods irrespective of figure. But if

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we test these sets by rules deduced from the syllogistic canon, we shall find that the great majority of them cannot make legitimate syllogisms. These rules are six in number. 1. In every syllogism there must be three, and only three terms. If this rule were overtly violated the pretended reasoning would not even have the form of a syllogism. 2. The middle term must be distributed in one of the premises. 3. Neither the minor term nor the major must be distributed in the conclusion, if it was undistributed in the premises. The first part of this rule implies that if one of the premises is particular the conclusion must be particular; and the second part of the rule, taken in conjunction with the second rule, implies that from two particular premises no conclusion can be drawn. 4. If both premises are affirmative, the conclusion must be affirmative. 5. If either of the premises is negative, the conclusion must be negative. 6. From two negative premises no conclusion can be drawn.

It would occupy too much space to show how all these laws are deduced from the syllogistic canon; but we will show that in the case of one rule for the sake of illustration. Let that rule be the second, which requires that the middle term must be distributed in at least one of the premises. The *dictum de omni et nullo* evidently requires that one of the two premises of a syllogism must either directly or by implication state a general case of which the other premise states a particular instance, so that if a certain predication is true in the general case it must also be true in the particular instance which is included in the general case. Now if we take two premises in neither of which the middle term is distributed, such as some C's are B, and all A's are B, we find that these do not meet the requirement of the dictum, for neither of these states either directly or indirectly a general case of which the other gives a particular instance. If, on the other hand, we alter one or other or both of these premises in such a manner as to distribute the middle term in one of the premises without violating any of the other rules, we arrive at a case which does meet either directly or indirectly the requirements of the fundamental canon referred to. Let us take, for example, the premises No C is B, all A's are B. It is evident that the first is equivalent to stating that no B is C, while the second mentions some things that are B, that is, gives a particular instance to which the general statement made by the first must be applicable. Again, let us take the premises All C's are B, Some A's are not B. It is evident that the first of these is equivalent to stating that all things that are not B are not C, while the second points to a particular set of things that are not B.

Let us now apply these rules to ascertain the number of logical moods. Two of them, the sixth and the corollary deduced from the second and third, apply to the premises exclusively, in such a manner as to serve as tests of the possibility of the various pairs of propositions entering into legitimate syllogisms as premises. The number of different pairs of propositions taken in different order is sixteen. They are AA, AE, AI, AO, EA, EE, EI, EO, IA, IE, II, IO, OA, OE, OI, OO. Three of these, II, IO, and OI, are excluded by the corollary to the second and third rules affirming that from two particular premises no conclusion can be drawn; three, EE, EO, and OE, are excluded by the sixth rule forbidding two negative premises; and one, OO, is excluded by both. If we closely examine the pair IE we shall find that it also must be excluded, for it follows from the first corollary to the third rule, and from the fifth rule, that any conclusion derived from these premises must be both particular and negative, that is O. But in such a conclusion the predicate would be distributed, whereas it could not have been distributed in the major premise I, as both terms of it are particular. A syllogism with the premises IE must therefore be a violation of the third rule. There thus remain only eight pairs of premises capable of entering into a valid syllogism, namely, AA, AE, AI, AO, EA, EI, IA, and OA. Three of these being universal both in the major and minor, AA, AE, and EA, may give either universal or particular conclusions. The conclusion of the others must be particular. There are thus eleven different sequences of propositions which yield valid syllogisms, AAA, AAI, AEE, AEO, EAE, EAO, AII, AOO, EIO, IAI, and OAO, and if all these could occur in each of the figures there would be forty-four syllogistic moods; but this number is limited by the special rules applicable to the different figures, and we must state these rules before we can see what are the valid moods for each.

The rules for the First Figure are three.—1. The minor premise must be affirmative. 2. The major premise must be universal. 3. The quality of the major premise determines the quality of the conclusion, and the quantity of the minor the quantity of the conclusion.

We will again demonstrate one of these rules, say the second, for the sake of illustration. It will be remembered that the formula of the first figure is $\frac{MP}{SM}$. Now if the major premise is not universal, its subject, the middle term, is not distributed; and as the minor premise by the first of our special rules must be affirmative, its predicate, also the middle term, cannot be distributed. The middle term is thus distributed in neither case, and the second general rule is violated. If we apply our special rules then to the eleven model forms we shall find that only four of them, AAA, EAE, AII, and EIO, can be exhibited in the first figure. The two, AAI and EAO, would also yield legitimate syllogisms, but as they infer a particular conclusion when a universal one, in accordance with the rule that the quantity of the minor premise determines that of the conclusion, is warranted, they are not used; and the same applies to two cases in the second and one in the fourth figure.

The rules for the Second Figure are also three:—1. One of the premises must be negative. 2. The conclusion must be negative. 3. The major premise must be universal.

Applying these rules to our eleven modal forms we again obtain four valid moods, AEE, EAE, AOO, EIO. AEO and EAO are the two which are rejected as yielding a particular conclusion when a universal one is warranted.

The rules for the Third Figure are two:—1. The minor premise must be affirmative. 2. The conclusion must be particular.

These two rules admit of six valid moods, namely, AAI, EAO, AII, EIO, IAI, and OAO.

The rules for the Fourth Figure have been variously stated, but the three following may be given as the most comprehensive of those that have been devised for it:—1. If the major premise is affirmative the minor premise must be universal. 2. If one premise is negative the major premise must be universal. 3. If the minor premise is affirmative the conclusion must be particular.

These special rules yield the five moods, AAI, AEE, EAO, EIO, and IAI. AEO is rejected on account of its having a particular conclusion when a universal one is warranted.

We now see that there are in all nineteen syllogistic moods, and in one or other of these every categorical deductive reasoning must be expressed before its validity can be tested. The difficulty of retaining these

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moods in the memory has led various logicians to embody them in mnemonic lines. The most ingenious are those invented in barbaric Latin for the first three figures by Petrus Hispanus, who filled the Papal chair with the title of Pope John XX. or XXI. in 1276–77. These lines not only represent by the ordinary vowels the syllogistic moods, but in the second and third figures also indicate by certain consonants the method by which they are to be reduced to syllogisms of the first figure. The mnemonics for the fourth figure are wanting in the lines of Hispanus, because that figure was not recognized by the earliest logicians (as it is still indeed condemned by many on account of its awkward and irregular mode of inference), but they were afterwards added in a new line. In their complete form these mnemonics stand thus:—

I. bArbArA, cElArEnt, primæ, dArII, fErIOque:
II. cEsArE, cAmEstrEs, fEstInO, bArOcO, secundæ:
III. tertia dArAptI, dIsAmIs, dAtIsI, fElAptOn,
fErIsO, bOcArdO, habet: quarta insuper addit
IV. brAmAntIp, cAmEnEs, dImArIs, fEsApO, frEsIsOn.

The vowels printed in capitals it will be seen show the moods of each figure; and for the consonants, the initial one shows that the syllogisms in the three last figures must be reduced to the one beginning with the same consonant in the first; *s* indicates that the previous proposition must be simply converted; *p* that it must be converted *per accidens; m* that the premises must be transposed (*metathesis* or *mutatio*); and *r* following a vowel indicates that the process called *reductio ad impossibile* (which will afterwards be explained and illustrated) must be resorted to.

Illustrative Syllogisms.—We will now illustrate the four figures by an abstract example in one of the moods of each of them.

1. Example in Barbara.

All B's are C's;
All A's are B's; therefore
All A's are C's.

Or we may take the following concrete example:—

All members of the Jewish Sanhedrim were married men and parents;
Paul was a member of the Jewish Sanhedrim; therefore
Paul was a married man and a parent.

2. Example in Baroco.

All C's are B's;
Some A's are not B's; therefore
Some A's are not C's.

3. Example in Datisi.

All B's are C's;
Some B's are A's; therefore
Some A's are C's.

4. Example in Camenes.

All C's are B's;
No B's are A's; therefore
No A's are C's.

Reduction.—To illustrate the process of reduction let us reduce the syllogisms given in Camenes and Baroco. The first is an ordinary case of *ostensive reduction*, as it is called, presenting no peculiarity; the second will furnish us with an example of that indirect species of reduction which is called *reductio ad impossibile* or *ad absurdum*, and which is applied to no mood but Baroco and Bocardo. In reducing Camenes we first learn from the initial letter that it must be reduced to Celarent, and we then learn from the *m* after the *a* that this must be effected by a transposition of the premises, so that instead of having them in the order given in our example, we have them in the order—

No B's are A's;
No C's are B's.

These premises yield us the conclusion No C's are A's, from which we get by simple conversion the original conclusion No A's are C's. It may be remarked that whenever the premises are transposed in reduction the conclusion must be converted either simply or by limitation, for in the process of transposition the major term has been changed into the minor, and the minor into the major, which has the effect of transposing the terms of the conclusion. Bramantip is the only case in which the conclusion has to be converted by limitation.

The reduction of Baroco ought properly to bring us to the mood Ferio, as that is the only mood of the first figure which has a conclusion in O, but this is a thing which cannot be done by any or all of the methods *s, p, m*. Accordingly the method adopted is this:—Instead of the actual conclusion of Baroco its contradictory is taken and substituted for the premise which is denoted by the vowel followed by the *c*. As the contradictory of O, the conclusion, is A we have now two premises in A, and as the predicate of the second A is the same as the subject of the first, since the predicate of the conclusion was the same as the subject of the major premise, we have now the premises of a syllogism in Barbara, from which we therefore draw a conclusion in A, as thus:—

Baroco.

All C's are B's;
Some A's are not B's; therefore
Some A's are not C's.

Barbara.

All C's are B's;
All A's are C's; therefore
All A's are B's.

This conclusion in Barbara, however, is the contradictory of the minor premise in Baroco which we rejected. It must, therefore, be false, but as it is legitimately inferred from the premises one of these premises must be false. It cannot be the major premise, for that is given as true; it must therefore be the minor, which is the contradictory of the original conclusion in Baroco. It follows that this conclusion must be true, since of two contradictory propositions one must be true.

Instead of this roundabout way of substantiating the conclusion in Baroco and Bocardo through a syllogism in Barbara another indirect method of reduction is sometimes employed, by which these moods are first reduced to others in the same figures, and then to one in the first figure (Baroco through Festino to Ferio; Bocardo through Disamis to Darii). In this method conversion by contraposition is made use of. We will illustrate it by an example in Bocardo.

Bocardo.

Some B's are not C's;
All B's are A's; therefore
Some A's are not C's.

Disamis.

Some B's are Not-C's;
All B's are A's; therefore
Some A's are Not-C's.

Darii.

All B's are A's;
Some Not-C's are B's; therefore
Some Not-C's are A's; therefore
Some A's are Not-C's; therefore
Some A's are not C's.

By turning back to the demonstration given of the second of the general rules of the syllogism it will be seen that this mode of conversion is there incidentally illustrated for Baroco.

Conditional Syllogisms.—It must have been observed that the syllogisms of which we have hitherto been treating are all composed entirely of categorical propositions, and are therefore categorical syllogisms;

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but we may also express deductive reasonings in a form in which one of the premises is conditional and the other premise relates to the condition expressed by the first. Where this is not the case the syllogism is not conditional, even though one of its premises may be so. Thus, A is either B or C; but D is A; therefore D is either B or C, is not conditional but categorical. The forms which such reasonings assume are as many as those of conditional propositions, and are known by the same names, hypothetical, disjunctive, and hypothetico-disjunctive, or dilemmatic. A *hypothetical* syllogism is one in which the major premise is a hypothetical proposition and the minor premise either affirms the truth of the antecedent or denies that of the consequent. In the first case (which is called the *modus ponens*, the *mood of position*, or the *affirmative mood*) the conclusion affirms the truth of the consequent; in the second case, which is called the *modus tollens*, the *mood of amotion*, or the *negative mood*, the conclusion denies the truth of the antecedent. The following are examples of each mood:—

Affirmative Mood.
If A is B, C is D;
But A is B; therefore
C is D.

Negative Mood.
If A is B, C is D;
But C is not D; therefore
A is not B.

Disjunctive syllogisms are those in which the major premise is a disjunctive proposition, and in which the minor premise either affirms the truth of one or denies the truth of one or more of the alternatives. In the former case the conclusion denies the truth of the other alternatives. It is called the *modus ponendo tollens* or *destructive mood*. It is obviously only valid where the disjunctive proposition forming the major premise is interpreted after the manner of some logicians as expressing an exhaustive alternative, that is to say, where a proposition of the form A is either B or C is taken to mean that A is one or the other, not both. In the case in which the truth of one or more of the alternatives is denied, the truth of one or other of the remaining alternatives, or if there is only one other alternative, the truth of that one is affirmed. This is called the *modus tollendo ponens* or *constructive mood*. The following are examples:—

Destructive Mood.
Either A is B or C is D;
Now C is D; therefore
A is not B.

Constructive Mood.
Either A is B or C is D;
Now A is not B; therefore
C is D.

Hypothetico-disjunctive syllogisms are those having a hypothetico-disjunctive major premise. They are regulated by the same rules as hypothetical syllogisms. The following is an example of the affirmative mood:—

If A is B, C is either D or E;
But A is B; therefore
C is either D or E.

Traduction.—The logic of ratiocination includes, as we have already indicated, another kind of reasoning of which we have not yet treated, that namely in which the conclusion is neither more nor less general than either of the premises. The following may serve as an example:—

The planet which is between the Earth and Mercury revolves round the sun in 224½ days;
But Venus is the planet which is between the Earth and Mercury; therefore,
Venus revolves round the sun in 224½ days.

The validity of a syllogism of this nature may be held to depend upon some such canon as the following:—Whatever is true as predicated of one subject must also be true as predicated of another subject denoting precisely the same object or objects as the first.

Other Varieties of Syllogism.—We have still left unmentioned three names applied by logicians to varieties of the syllogism which are not varieties in its nature but merely in the mode of its expression. These are Sorites, Epicheirema, and Enthymeme. *Sorites* is a Greek word signifying a heap, and is applied to a syllogism in which more than two premises occur in the antecedent, as thus—All D's are E's, All C's are D's, All B's are C's, All A's are B's, therefore All A's are E's. This, however, is evidently nothing else than a series of syllogisms in which some of the steps are omitted, and is equivalent to All D's are E's, All C's are D's, therefore all C's are E's; All C's are E's, All B's are C's, therefore All B's are E's; and so on. It is needless to give a concrete example. The *Epicheirema* is a syllogism in which a reason is attached to one or more of the premises, in the form A is B and C is A, for it is D, therefore C is B. This also is manifestly compound, inasmuch as the premise with the reason attached to it must be capable of resolution into a separate syllogism of this form—All D's are A's, C is D, therefore C is A. Finally, the *Enthymeme* is a syllogism in which one of the premises is omitted, as All A's are B's, therefore they are C's. It is clear that this omission can only be in the expression of the syllogism, for the inference contained in the conclusion of this syllogism would not be legitimate unless it were true that All B's are C's, which premise must accordingly be supplied by the mind.

Fallacies.—A section on fallacies or invalid reasonings forms the usual supplement to an exposition of the theory of deductive logic. As a complete statement of the principles of ratiocination must contain tests of the validity of all valid deductive reasonings, every fallacy or invalid reasoning must consist in a violation of one or other of these principles, that is, in a violation of some one or more of the six general laws applicable to the categorical syllogism or of the rules given for regulating the modes of inference in conditional syllogisms. A violation of the first law of the syllogism, that which requires that there shall be only three terms in it, can happen in such a manner as to leave the form of a true syllogism, only when the same middle term is used in different senses in the two premises, that is, when the middle term is ambiguous in meaning—a very common source of fallacy. The violation of the second rule as to the distribution of the middle term in one of the premises is called the fallacy of *Undistributed Middle*. The violation of the third, which says that no term must be distributed in the conclusion if it was not distributed in the premises, is called an *Illicit Process*. If it is the minor term in which the fallacy arises it is called the *Illicit Process of the Minor*; if it is the major term, the fallacy is called the *Illicit Process of the Minor*. The fallacies of undistributed middle and illicit process are called *Fallacies of Quantity*; violations of the remaining syllogistic laws (4th, 5th, and 6th) are called *Fallacies of Quality*. For these there are no special names, nor for the violations of the laws relating to conditional syllogisms. These are all the fallacies belonging to the form of ratiocination, which is all that deductive logic has properly anything to do with. See FALLACIES.

INDUCTIVE LOGIC. *Definition of Induction.*—Having thus completed our summary of the received exposition of deductive logic we now pass to the other

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section of the science, to which the name of Inductive Logic is given; and in treating of it we will confine ourselves to the views of J. S. Mill, the writer whom we have already mentioned as the most systematic expositor of that part of logical science. Induction is shortly defined by him as 'generalization from experience.' At another place he states more minutely that 'it consists in inferring from some individual instances in which a phenomenon is observed to occur, that it occurs in all instances of a certain class; namely, in all which *resemble* the former, in what are regarded as the material circumstances.' Again, Induction is, 'without doubt, a process of real inference. The conclusion in an induction embraces more than is contained in the premises. . . . A principle ascertained by experience is more than a mere summing up of what has been specifically observed in the individual cases which have been examined: it is a generalization grounded on those cases, and expressive of our belief that what we there found true is true in an indefinite number of cases which we have not examined, and are never likely to examine.'

Ground of Validity of Inductive Reasoning.—Such being the nature of induction, Mill's system of inductive logic supplies the principles of correct generalization and tests of the legitimacy of general inferences. But although this is the case, it was hinted at the beginning of this article that the restriction of the term logic to the science which estimates evidence the sufficiency of which depends more or less immediately on something which is admitted as a truth at least as general in its nature as that which it is held to prove, is not inconsistent with the view taken by Mill of the scope of inductive logic. What, then, is the general truth, or what are the general truths upon which inductive reasoning ultimately depends for its validity? Of these there is only one, the great fact of causation, the law that everything which has a beginning has a cause. 'The notion of cause,' in the words of Mill himself, 'is the root of the whole theory of induction;' and if the law of causation were denied, the principles of inductive logic, though still rigorously true, would have no application to the investigation of nature. Let us see, then, what is this notion of cause, which plays so important a part in the theory of induction. It would be both needless and out of place to go into a metaphysical inquiry into the precise nature of a cause, and the origin of our belief in causation. It is enough to give such an account of our idea of a cause as is sufficient for our present purpose, and is at the same time universally accepted as true so far as it goes, whatever may be thought as to its adequateness. The following statement of the law of causation answers these requirements. 'Everything that happens, happens as the consequent of some antecedent which is its cause, or some set of antecedents which jointly form its cause, and which, unless counteracted or modified in its operation by the operation of some other cause, is invariably followed by the phenomenon in question.' Mill's definition of a cause as 'an invariable and unconditional antecedent' is open to the objection that it would seem to imply that every event must always have the same cause, which is not the case. The same event may be produced by several different causes, but the same cause has always the same effect. Thus heat is produced by friction, concussion, combustion, and in various other ways, but every one of these causes must invariably produce or tend to produce heat. The necessity of making the occurrence of a given phenomenon dependent upon the cause of that phenomenon not being counteracted or modified by the operation of some other cause, will be seen from supposing the cause of a ball being acted upon by the same force under different circumstances. Let us suppose first that the ball lies upon a level surface which is as smooth as possible, and that some solid body is made to impinge upon it with a certain force acting in a certain direction, the result will be that the ball will roll along the level surface to a certain distance, and then remain still. Suppose now this experiment to be repeated under exactly the same circumstances, except that the surface on which the ball lies is rough instead of smooth; it will then be found that the ball will stand still before it has reached the point which it reached in the first case; but this is not because the same force as a cause has not always the same effect, but because its effect is counteracted or at least modified by the operation of another cause, namely, the increased friction resulting from the rough surface. So also, if the ball were fixed to the surface so firmly as not to move under the impact of the other solid body. From this explanation it will appear that although it is true that a phenomenon which has once been brought about by a certain cause may, under certain circumstances, not occur when that cause is present, yet it would be an incorrect account of that fact to say that a cause is sometimes not followed by its effect. Before leaving this subject it may be mentioned that when we speak of the operation of a cause, we do not mean to imply that there is some unexplained connection between cause and effect beyond what is actually observed. The decision of the question of the reality of such a connection does not belong to the province of logic; and all that is meant when the operation of a cause is spoken of, is merely the fact of that cause being followed by its effect.

Inductive Canons.—We may now proceed at once to state the rules which Mill gives for generalizing from experience, the rules to which he gives the name of Inductive Canons.

I. The first he calls the Method of Agreement, which he enunciates thus:—'If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon.' He gives the following as the axiom upon which it depends. 'Whatever circumstance can be excluded without prejudice to the phenomenon, or can be absent notwithstanding its presence, is not connected with it in the way of causation. The casual circumstances being thus eliminated, if only one remains, that one is the cause which we are in search of: if more than one, they either are, or contain among them, the cause.' The canon is exhibited in the formula ABC, abc; ADE, ade; AFG, afg; where a may be taken to represent the phenomenon under investigation, and A therefore, in accordance with the canon just stated, will be the cause of a, as it is the only circumstance in which all the cases in which a occurs agree. To illustrate these canons by concrete examples in such a manner as to give anything like a satisfactory idea of their application in scientific inquiry would occupy far too much of our space, and we must therefore refer the reader who is desirous of seeing this done to Mill's own work (System of Logic, book iii. ch. ix.) We may, nevertheless, mention as a trifling example of this method, that it is by it that we know that every plant reproduces its own kind. Our knowledge of this fact is an inference from the uniform observation that all plants of a particular species agree in having proceeded from some member of that species, whether by seed, bud, slip, or any other means. This method is of very wide application, but it must be mentioned that it labours under two defects, one of which even invalidates its theoretic

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accuracy. The first defect consists merely in the difficulty of having the conditions of the method fully satisfied, that is, the difficulty of ascertaining that the cases investigated do agree only in one particular. The other defect arises from the plurality of causes, or from the fact to which attention has already been drawn, that different causes may produce the same effect. This circumstance renders the axiom on which the canon is said to depend false, for although a circumstance which was present, in which a phenomenon occurred may be absent in another case in which the same phenomenon occurs, this does not prove that the circumstance in question did not in the first instance produce the phenomenon. It may have been the cause in one case, and something else in another.

II. The second canon is called the Method of Difference, and according to Mill depends on the axioms, 'Whatever antecedent cannot be excluded without preventing the phenomenon is the cause, or a condition, of that phenomenon. Whatever consequent can be excluded, with no other difference in the antecedents than the absence of a particular one, is the effect of that one.' The canon itself is this: 'If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect, or the cause, or a necessary part of the cause of the phenomenon.' The formula of the canon (the same notation being used) is *ABC, abc: BC, bc. A* must be the cause of *a*. This is by far the most important of the inductive canons, both on account of the extent of its application, and also from its being free to a great extent from the practical difficulties besetting the application of the first method, and altogether free from objection as to its theoretical validity. If the only things that could have produced *a* are ABC, and BC alone are not sufficient to produce it, it follows inevitably that A is at least an indispensable part of its cause. Examples of inference in accordance with this canon are constantly occurring. We may find at least two in the illustration we have already used of the ball on a level surface acted upon by an outward force. It is by the method of difference we know that the motion of the ball across the surface is due to the impact of the other solid body, for before that impact the ball was stationary, but immediately after it began to move, although (as we have supposed) no other change took place in the circumstances. It is also by the method of difference that we know that in the second instance, when the ball was placed upon a rough surface, and acted upon by the same force as in the first, its stopping before it reached the point it had reached in the first instance is due to the roughness of the surface, for that is the only circumstance in which the cases differ.

III. The third of Mill's canons of inductive logic is an attempt to combine the first two, with the object of helping to remove the uncertainty which belongs to the first. It is called the Indirect Method of Difference, or the Joint Method of Agreement and Difference, and is stated thus: 'If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the effect, or cause, or a necessary part of the cause of the phenomenon.' Its formula is *ABC, abc; ADE, ade; AFG, afg: HBC, hbc; IDE, ide; KFG, kfg.* We may again return to our illustration from vegetable reproduction for an example of this method. If, besides examining the cases in which plants of a certain species are produced, we examine those in which they are not produced, but, we will suppose, some other plants closely resembling them are produced, and find that the circumstances attending the production of these latter differ from those attending the production of the former only in respect of the origin of the seed, bud, slip, or whatever else it may be from which they respectively proceeded, we shall have a case of the joint method of agreement and difference, and our conclusion in the former case will be greatly strengthened. This method is, however, no more theoretically rigorous than the first, for even although we exhaust in the negative set of instances all the antecedents that were found in the positive set except one, yet we can never be sure that that one is the cause as long as the negative instances, besides excluding the one that was found constant in the positive set, include some new circumstance or circumstances besides those that were found in combination with *A* in the positive set, for these new circumstances may have been the very causes why the phenomenon under investigation did not occur. In *ABC, abc, B* may have been the cause of *a*, and in *HBC, hbc, H* may have been the circumstance that counteracted the operation of *B*, so that *a* did not appear: in *ADE, ade, D* may have been the cause of *a*, and may have been counteracted in *IDE, ide*, by *I*.

IV. The fourth inductive canon is called the Method of Residues, and, like the method of difference, is based upon the principle of a complete elimination of all circumstances not connected by way of causation with the phenomenon under investigation. It is this: 'Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.' It is by an application of this method that when we know the weight of a vessel and its contents, and also the weight of the vessel alone, we can infer the weight of its contents. This is manifestly equally rigorous in its principle with the method of difference.

V. The last inductive canon is applicable to those cases in which we cannot obtain a case of the method of difference, owing to the impossibility of removing the phenomenon under investigation. Thus we cannot entirely remove heat from a body, and therefore cannot observe the effect of heat by examining some body first without and then with heat. We cannot remove the sun from the solar system, and therefore cannot tell by actual experiment what effect its absence would have. In these circumstances we resort to the Method of Concomitant Variations, which depends on the axiom, 'Anything on whose modifications modifications of an effect are invariably consequent must be the cause (or connected with the cause) of that effect.' The canon itself is enunciated thus: 'Whatever phenomenon varies in any manner whenever another varies in some particular manner is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.' Although we have no opportunity of observing any body absolutely deprived of heat, we can observe the same body at different temperatures. It is in this way that we discover that heat has the effect of expanding bodies, for with no other change than an increase of temperature we see that mercury expands. The fact of the concomitance must be proved by the method of difference. This method is rigidly exact to prove the connection of two phenomena in the way of causation, but is not sufficient to prove that the one is the cause of the other. The two phenomena may be two different effects of a common cause. The doubt as to which is cause and which effect, or whether

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either is the cause of the other, can only be removed in those cases in which we can produce one series of phenomena by means of the other, as we find that by gradually increasing the heat of bodies we increase their bulk, but by increasing their bulk we do not increase their heat.

Relation of Inductive to Deductive Logic.—We have thus supplemented our account of deductive with an account of inductive logic, but we cannot leave this subject without saying something on the question of the precise relation which the latter bears to the former; whether it is a distinct species of logic or the science of proof, or whether it is merely an application of that science. Mill holds that there are two distinct modes of inference—the deductive, from generals to particulars; and the inductive, from particulars to generals, and accordingly that there are two different branches of science for investigating the laws of the different modes. He goes further than that, and gives it as his opinion that the inductive inference is the only real inference, and that deductive inference does not deserve the name, inasmuch as the conclusion cannot state anything more than has already been stated in the premises; that the process of ratiocination is not a process by which we arrive at new facts, but merely one by which we interpret the knowledge that we have already summed up in general propositions. These statements as to the real nature of deductive inference may be accepted as true, but we do not on that account feel called upon to give up applying the term inference to that process of interpretation, for that term is the one which is applied by general usage to the process. Besides, if after Mill's analysis of the syllogistic process we are to be obliged to refuse the name of inferences to conclusions reached by that process, it may be questioned whether Mill himself has any more right to apply the name to the conclusions obtained by his inductive processes, for it may not be difficult to show that the latter are as truly deductive as the former.

Analysis of Induction.—In order to do this we must analyze more thoroughly the Method of Difference, which Mill himself states to be 'that by which alone we can ever in the way of direct experience arrive with certainty at causes.' We must see what is the precise nature of the conclusion which this method affords us, and what is the real ground of its legitimacy. The formula of the method of difference is *ABC, abc: BC, bc*, which is equivalent to saying that in a particular case in which *a* happens the antecedents are *ABC*, but when the antecedents *BC* are found alone *a* does not happen, so that *A* must be the cause or a necessary part of the cause of *a*. Now Mill allows that the law of causation, that every event has a cause, is the foundation of all inductive reasoning. How then are we to connect the reasoning in this instance with that law in such a manner as to show that the reasoning is legitimated by the law which is advanced as the ground of its legitimacy? We shall see whether this cannot be done by a regular series of syllogisms, the premises of which are derived partly from the great law referred to, and partly from direct observation, without the slightest admixture of inference beyond what is contained in the syllogisms themselves. Since every event has a cause, and *a* is an event, *a* must have a cause. A cause of a phenomenon is one or more of the antecedents of that phenomenon (definition of a cause); therefore the cause of *a* is one or more of its antecedents, but the antecedents of *a* are *ABC* (direct observation); therefore the cause of *a* is either *A*, or *B*, or *C*, or some combination of these. Now every cause is invariably followed by the phenomenon of which it is the cause, unless some other cause intervenes to prevent it (definition of cause); therefore if *B* or *C*, or both combined, are the cause of *a*, they must be followed by *a*, unless something else intervenes to prevent that result. But in our second instance *B* and *C* are present, and nothing else has intervened; therefore, if they are the cause of *a*, *a* must follow. But our observation shows that *a* does not follow; therefore neither *B* nor *C*, nor a combination of both, is the cause of *a*. We have now found by our first chain of deductive reasoning that the cause of *a* is either *A*, or *B*, or *C*, or some combination of these, and by our second chain that it is neither *B* nor *C*, nor *B* and *C* combined, and we have thus got the premises of a disjunctive syllogism in the constructive mood, from which the conclusion necessarily follows that the cause of *a* is either *A*, or some combination of *A* with *B* or *C*, or both; or in other words, that *A* is either the cause or a necessary part of the cause of *a*, which is the conclusion we arrived at in applying the inductive canon called the method of difference. Now what is the nature of this conclusion? It is not only not more general than the premises from which it is derived, but strictly a singular one, that the cause of *a* is *A*, or some combination into which *A* enters. The apparently general nature of the conclusion results solely from the notion of a cause; for if *A*, or some combination with *A*, is the cause of *a*, it follows from the definition of a cause that when any phenomenon exactly similar to *A* (or the proper combination with *A*) occurs it will be followed (under the condition stated in that definition) by a phenomenon exactly similar to *a*. It will be seen from this analysis that it is not correct to say that the method of difference depends upon the axiom annexed to it. The conclusion obtained by it depends solely on the law of causation, and the experiment showing that in a particular case, when a certain antecedent has been excluded, with no other change in the antecedents, the phenomenon has not followed. The fact that that antecedent *can not* be excluded is the very inference that we make when we conclude that that antecedent which is excluded is a necessary part of the cause of the phenomenon.

What has been shown in the case of the Method of Difference might be shown also in the case of the other inductive canons which are theoretically perfect; as it might be shown that the method of agreement and the joint method of agreement and difference are not theoretically perfect, simply because their conclusions could not be deduced from the law of causation like that of the method of difference. All induction proceeding through the application of the five canons is thus in reality deduction, and inductive logic is thus not a species of logic co-ordinate with deductive, but merely an application of the latter. It need scarcely be remarked, however, that it thus loses none of its value, and that, as showing the very wide and fertile applicability of the law of causation as a great premise, it is none the less worthy of receiving a separate and systematic exposition, and being designated by a separate name. But there is still a class of inferences, or supposed inferences, to which the name of inductions is given by Mill, although they are not obtained by an application of the canons, those which are known as inductions by simple enumeration, in which it is inferred that because a thing is true in a large number of observed instances it is true in all instances. This is the kind of inference by which, according to him, we arrive at the law of causation itself; but as no precise and rigorous principles can be enunciated in regard to it, as the sphere of its applicability is still a matter of dispute in metaphysics, since metaphysicians are not agreed as to what our belief in the law of causation, for example, is really founded on,

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it will perhaps be better to hand over all such questions to the latter science, and confine logic, as we did in the outset, to the investigation of the laws of reasoning in which the premises are at least as general as the conclusion, that is, as we have shown, to the logic of ratiocination and its applications.

BIBLIOGRAPHY.—The oldest work on deductive logic is the Organon of Aristotle. Improvements of the Aristotelian system were made by some of his immediate successors, especially by Eudemus and Theophrastus. Among the more modern works on the subject that may be consulted with advantage are La Logique, ou l'art de penser, by Arnaud and Nicole (Paris, 1662), translated into English, under the title of The Port Royal Logic, by T. S. Baynes (Edinburgh, 1854); Mansel's edition of the Compendium of Aldrich; Whately's Logic; some articles on the subject in Sir W. Hamilton's Discussions (second edition, 1853); Lectures on Logic by the same author (1860); Thomson's Outlines of the Laws of Thought; Karslake's Aids to the Study of Logic; R. G. Latham's Logic in its application to Language; De Morgan's Formal Logic, or the Calculus of Inference (in which mathematical principles are applied to the subject); Boole's Mathematical Analysis of Logic; and Jevons' Principles of Science (1874). On inductive logic the most important works are Bacon's Novum Organum (1620); Sir John Herschel's Preliminary Discourse on the Study of Natural Philosophy (London, 1831); Whewell's Philosophy of Inductive Sciences (1840); and the work which we have followed, and which has to a great extent superseded all others, Mill's System of Logic (third edition, 1851).

LOGOS (Greek, *logos*, from *legein*, to speak) has a great variety of meanings: 1. language, speech in general; hence, 2. every manifestation of the reason and understanding by language, so that it has the meaning of oration, eloquence, conversation, address, also of the right and opportunity of speaking, &c. Language being peculiar to man as a reasonable being, and speech presupposing thought, *logos* signifies, 3. reason, the faculty of thinking in general; 4. everything which is a production of the latter, as notions, conceptions, demonstration, calculation, explanation, condition, and relation, nay even wisdom and logic. Thus *logos* has the meaning both of *ratio* and *oratio*. In Christian theology the word *logos*, as used in certain passages of the Scriptures, has been the source of continual disputes ever since the third century of our era. The passage in the Bible which gives rise to this discussion is the opening of the Gospel of St. John: 'In the beginning was the Word, and the Word was with God, and the Word was God. The same was in the beginning with God. All things were made by him, and without him was not anything made that was made,' &c. In the Greek text the expression here translated *Word* is *logos*. What is here to be understood by *logos*, what is its essential character, whether it is a person of the Deity or not, the creative intellect of God, or the Son, through whom he created, or the divine truth which was to be revealed, &c., this work is not the proper place to examine, nor will our limits permit us even to enumerate the different opinions which have been entertained on this interesting point of Christian metaphysics. We can refer the reader to no better source of information than Neander's General History of Christianity and the Church. The generally received doctrine of the *logos* makes it a person and not a mere name, and maintains that the Word is called *God*, not by catachresis, but in the strict and rigorous meaning of the term; that the most ancient fathers of the church always taught the divinity of the Word, and that they derived the idea from the Holy Scriptures alone, and not from the Platonic philosophy as many have asserted. For a view of the Catholic doctrine we must refer our readers to the Catholic Dictionnaire de Théologie (Toulouse, 1817), article Verbe, and to the works particularly devoted to this subject. Some of the opinions of modern theologians on the meaning of the *logos* are as follows: It is necessary, some say, in order to understand the true meaning of *logos*, to begin with the examination of *sophia*, which was previously used. (See the book of Proverbs, viii. 1, et seq., and the book of Wisdom, vii. 22, et seq.) The poetical author of the Proverbs does not imagine a person separate from God, but only an interior power of God, because, in his time there could be no idea of a being proceeding from God, the Jews having borrowed this notion at a later period from the oriental doctrine of emanations. The author of the book of Sirach (xxiv. 3) first uses *logos tou theou* as equivalent to *sophia*, to signify the almighty power of God. The Word being an act of wisdom gave rise to the symbol. John speaks of the *logos* in the beginning of his Gospel only, and afterwards uses the expression *pneuma tou theou*. From his representation the following positions have been deduced: the *logos* was (*a.*) from the beginning of all things (comp. Proverbs viii. 22; Sirach xxiv. 9); (*b.*) from the beginning with God (comp. Sir. i. 1; Wisd. ix. 4, 9); (*c.*) through it the world was created (Prov. Sol. viii. 31; Sir. xxiv. 9); (*d.*) in the person of Christ the *logos* was manifested as a man to the world (Wisd. Sol. x. 16; ii. 14; Sir. xxiv. 12). St. John, therefore, say those who thus interpret him, had the same idea of the *logos* as the apocryphal writers; for the circumstance that the latter ascribe to the *logos* the creation of all things, while St. John leaves this point undecided in his *en archē ēn* (in the beginning was), does not amount to a contradiction. Others, particularly the earlier commentators, understand by *logos* the Deity himself, that is, the second person of the Deity (according to St. John viii. 58). But those who adhere to the former opinion maintain that this is in contradiction to John xiv. 28; xii. 49, 50; v. 19, 20; and that he understood by *logos* only a power of God, which was communicated to Jesus, on account of which he could claim divine attributes and yet call the Father, as the source of this power, greater than himself. Others, as Herder, Paulus, Eckermann, understand by *logos* the Word of God, which, in the Old Testament, as the expression of the will of God, is the symbol of his creative power (Gen. i. et seq.) The later Jews represented the divine omnipotence by the *word of God*. But it is maintained, on the other hand, from the manner in which John speaks of the *logos*, that he understood by it not merely omnipotence, but the Omnipotent. Others following the fathers of the church, particularly Eusebius, understand by *logos* an independent substance, external from God, like the *nous* of Plato. But this again, it is said, involves an error, because Plato means by *nous* only a power of God. Still others, as Mosheim, Schlegel, Jerusalem, declare with Irenæus the *logos* of St. John to be identical with the *logos* of the Gnostics; but it is objected that John did not conceive of a plurality like that in the doctrine of æons. Lange considered *logos* equivalent to the *sophia* of the Old Testament, and that to the *logos* of Philo, and as a distinct person from God; but, say the others, *sophia* is not something distinct from God. Paulus, in his Commentary, also identifies the *logos* of Philo with that of St. John. But it is said, on the other hand, that John cannot be supposed to have been acquainted with Philo's notion, as it was not an opinion commonly known at the time, and that the view of the apocryphal writers is more similar to his; moreover, that if St. John meant anything more than an origi-

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nal, eternal power in God, his *Theos ên* would imply dualism. Others have attempted grammatical explanations. Döderlein and Storr translated the word *logos* by *doctrina*, the abstract being put for the concrete, *doctrine* for *teacher*, as in Gen. xlii. 38; 2 Sam. xxii. 23; Luke iv. 36. According to others, *ho logos* means *ho legomenos* (the promised); but history makes no mention of Christians who still expected a Messiah. The ancient philosophers often distinguish two *logoi*, an interior in God or man which merely thinks (*logos endiathetos*), and an exterior or uttered (*logos prophorikos*).

LOGROÑO, a town in Spain, capital of the province of same name in Old Castile, on the right bank of the Ebro, here crossed by a handsome stone bridge. It is walled and well built, and there is an old castle crowning an adjoining height. The manufactures are woollen, linen, and hempen fabrics, hats, cards, leather, candles, soap, brandy, wine, oil and vinegar. It was twice taken by the French in 1808. Pop. 13,393.—The province, in the north, where it borders the Ebro, is level and fertile, but in the south is generally mountainous and barren. The minerals include copper, iron, antimony, tin, coal, and marble. Area, 1944 square miles; pop. in 1878, 174,425.

LOGWOOD. This important article of commerce is the wood of the *Hæmatoxylon Campechianum*, a tree belonging to the nat. order Leguminosæ, which grows wild, in moist places, along the western shores of the Gulf of Mexico. From its abundance in some parts of the Bay of Campeachy it is sometimes called *Campeachy-wood*. The leaves are pinnate; the flowers small, yellowish, and disposed in axillary racemes at the extremity of the usually spinous branches. The wood is red, tinged with orange and black, so heavy as to sink in water, and susceptible of receiving a good polish; it is used in medicine, but chiefly in dyeing. Though cultivated to some extent in Jamaica, the logwood of commerce is chiefly obtained from Honduras, where the cutting of it forms an extensive but unhealthy branch of business. The finest kind comes from Campeachy, the inferior qualities from Honduras and Jamaica, to which island it is not indigenous, but where it grows abundantly since its introduction. In the preparation of this wood for use, the trees, which are from 40 to 50 feet high, are cut down, the bark and alburnum removed, and the hard centre parts cut up into 3-foot-long logs. It is afterwards hewn into much smaller pieces, and ground or rasped to small chips. The aqueous extract is muddy and of a reddish-brown colour. By acids the red colour is made paler; by alkalies it is converted to purple. Salts of iron, aluminium, and lead give precipitates of a blue, violet, or purple colour. Logwood is chiefly consumed in dyeing cotton cloth, silk, wool, and leather; by mordanting the fabric with iron, black is produced; with alumina, violet and lilac; with copper, blue; and with chromium, a black or green—the exact tint depending on the composition of the mordants and logwood liquors, and the mode of application. The colouring power of logwood depends chiefly on a crystalline ingredient called hæmatoxylin (which see), but chemists are not agreed as to the effects of the oxidation produced by allowing the rasped wood moistened with water to be acted on by the air. There is no doubt the tinctorial value of the wood is increased by the operation; care, however, has to be taken that the oxidation is not carried too far. In medicine both the extract and the decoction of logwood are used. The former is prepared by exhausting the wood with boiling water, filtering, and evaporating to a thickish syrup; the latter is the watery extract of the wood along with some cinnamon. Both are used as astringents in diarrhœa.

LOIRE (anc. *Liger*), one of the principal rivers of France, which it divides into two nearly equal portions, traversing it almost throughout its whole extent E.S.E. to W.N.W. It rises on the western slope of the Cevennes, in the Gerbier des Joncs, in the department of Ardèche, about 20 miles west by north of Privas, and flows generally north and north-west through the departments of Haute-Loire, Loire, Saône-et-Loire, and Nièvre to Orleans, in the department of Loiret, passing the towns of Le Puy, Roane, and Nevers. At the town of Orleans its course changes to south-west, a direction it maintains for some distance, and then flows generally westwards till it falls into the Bay of Biscay below Nantes. In this latter part of its course it flows through the departments of Loir-et-Cher, Indre-et-Loire, Maine-et-Loire, and Loire-Inférieure, and passes the towns of Blois, Tours, and Nantes. At Digoin, in the department of Allier, it is crossed by the Canal du Centre. In its course it receives the Arroux on the right, in the department of Saône-et-Loire, and nearly opposite, from the left, the Odde and Bebre, from the department of Allier; and in the department of Nièvre it receives, on the left, the Allier, which almost doubles its volume; on the borders of the departments of Indre-et-Loire and Maine-et-Loire it receives the Vienne, its second great tributary; and also on the left, near the centre of the last-named department, it is greatly augmented by the Mayenne, which joins it on the right, bearing in its flood the united waters, likewise, of the Loir and Sarthe. Other two smaller streams, the Endre and the Sevre-Nantaise, join it at Nantes, one coming from either side. Below Nantes, where it first feels the influence of the tide, it is more an estuary than a river. It becomes studded with islets, and shortly after pours its mighty flood into the Bay of Biscay, about 3 miles below Paimbœuf. The whole course of this majestic river is about 600 miles. It first becomes navigable at Noirie, but only for vessels following the course of the stream, and not upwards, without tracking. The navigation properly begins about 45 milés lower, at Roane, about 450 miles above its mouth. In the lower part of its course the navigation is very much interrupted by shifting sands. The river is also much subject to inundations, which have on many occasions committed fearful ravages; and the danger of which, notwithstanding expensive erections intended to guard against it, cannot yet be considered as entirely removed. The most gigantic of these erections is what is known as the Levée of the Loire. Its origin dates as far back as the time of Charlemagne. On the side of the river it is built of tuff-stone, resting upon two rows of stakes. The present breadth of the levée at its base is from 80 to 115 feet, and at the top from 20 to 40 feet. It was broken twenty-seven times between 1496 and 1711; but in 1799 resisted a higher flood than the preceding ones. At the commencement of its course the Loire flows through a wild and romantic country, and has all the characteristics of an impetuous mountain torrent. As it descends its valley widens out, forming extensive plains, so richly covered with orchards, vineyards, and corn-fields that they have justly received the name of the *garden of France*. The basin of the Loire has been estimated at one-fourth of the whole surface of the kingdom, or about 50,000 square miles.

LOIRE, a central department of France, bounded on the north by the department of Saône-et-Loire, on the east by the department of Rhône and the river Rhone, which separates it from Isère, on the south by the departments of Ardèche and Haute-Loire, and on the west by the departments of Puy-de-Dôme and Allier; area, 1837 square miles. The department is traversed centrally, south to north, by

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the Loire, into which, and a few smaller tributaries, its waters flow; and consists of the fertile plains which extend on both sides of that river, forming its valley, and long ridges of the Cevennes, which hem the valley in on every side. The only modification that must be made to this description is in the south-east, where the Rhone forms the boundary, and receives the waters of the eastern side of Mount Pilate. Many of the mountains are covered with verdure to their summits, and feed large numbers of cattle, from the dairy produce of which excellent cheese is made. On the mountain slopes fine chestnuts are grown, well known in commerce as the chestnuts of Lyon. Above one-half of the surface is arable. The chief agricultural products are wheat, rye, barley, oats, hemp, and potatoes. The last and chestnuts form a principal article of food among the lower classes. A good deal of wine is produced, but ranks only as *vin ordinaire* of the first quality. Iron and lead are wrought to a limited, and coals to a large extent, part of the department being in the coal-field of the Loire, the most important in France. Iron is smelted, and extensively manufactured into articles of hardware; silk, ribbons, crape, velvet, linen and cotton goods, porcelain, and common earthenware are made, and glass keeps numerous furnaces in constant operation. Loire was anciently inhabited by the Segusiani, and afterwards included in the Roman province of Lugdunensis. At a later period it took the name of Forez, of which Feurs was the capital, and formed an independency, which was long governed by its own counts. Ultimately, in the reign of Francis I., it was united to the crown of France. For administrative purposes Loire is divided into three arrondissements—Montbrison, Roanne, and Étienne; and subdivided into thirty cantons and 330 communes. The town of Montbrison is the capital of the department. Pop. (1881), 599,836.

LOIRE, HAUTE, a department of France, bounded on the north by the departments of Puy-de-Dôme and Loire, east by Loire and Ardèche, south by Ardèche and Lozère, west by Lozère and Cantal; area, 1915 square miles. It is surrounded on all sides by lofty mountains, which belong to the Cevennes. A branch from the south intersects the department centrally, and forms the watershed between the Loire and the Allier, whose valleys accordingly share the far greater part of the surface between them, and are furrowed by numerous small tributaries hastening on to join their main channels. All the mountains are volcanic. The loftier mountains are generally covered with forests, in which wild boars, wolves, foxes, wild cats, deer, and many varieties of smaller game abound, or with verdant pastures, on which large herds of cattle and mules are reared. On some of the lower slopes magnificent chestnuts grow spontaneously, and vines also, by careful cultivation, are occasionally made to thrive. The soil of the plains and valleys is generally fertile, and favours the growth of all the ordinary crops. Notwithstanding the rugged nature of the country, the extent of waste land is considerably under one-fifth of the whole; while nearly three-fourths are available either for the plough or for meadows, gardens, orchards, and vineyards. The minerals are of little economic value, though some coal, lead, and antimony are obtained. The chief manufactures are coarse woollen stuffs, ribbons, and lace; the last chiefly in the hands of females of the poorer class, who do the work at their own houses. Ribbon-weaving is extensive in the northern cantons, and lace-making in the southern; the latter is said to employ 100,000 persons, and the value of it to be £1,000,000 annually. Haute-Loire, in the time of Cæsar, was inhabited by the Vellavi, and formed part of the Roman province of Aquitania Prima. In the fifth century it fell under the dominion of the Visigoths, and a century after under that of the Franks. At a later period it belonged to the counts of Toulouse; and in the thirteenth century passed, with the rest of Languedoc, to the crown of France. For administrative purposes this department is divided into three arrondissements—Le Puy, Brioude, and Yssingeaux; and subdivided into twenty-eight cantons and 264 communes. The town of Le Puy is the capital of the department. Pop. (1881), 316,416.

LOIRE-INFÉRIEURE, a western maritime department of France, bounded on the north by the department of Ille-et-Vilaine, north-west by the department of Morbihan, west by the Bay of Biscay, south by Vendée, and east by Maine-et-Loire; area, 2653 square miles. The surface of this department is flat. The coast is much indented, lying exposed to the billows of the Bay of Biscay, which are continually making encroachments upon it, and forming extensive salt-marshes. The great river is the Loire, which traverses the department east to west, and discharges itself into the Bay of Biscay. The other navigable rivers are the Vilaine, which for a short distance separates this department from those of Ille-et-Vilaine and Morbihan, the Maine, Moine, Erdre, Tence, Brivé, Boulogne, and Ognon. Lagoons and lakes are very numerous. The largest is Grandlieu, which has an area of 24 square miles. Both lakes and rivers, as well as the sea-coast, abound with fish. Nearly one-half is arable, and about one-fifth waste. Winter is comparatively mild; but the heats of summer are often so excessive as to be almost tropical. The chief minerals are coal, bog iron-ore, and kaolin. The manufactures consist principally of woollen, linen, and cotton stuffs, ticks, and serges. Ship-building and the allied trades are carried on to a considerable extent. Smelting-furnaces for iron and other iron-works are also in operation. To these may be added tanneries, glass-works, potteries, and paper-mills. Both the internal and coasting trade is very important. The principal ports are Nantes and St. Nazaire. A good many vessels are employed in the whale, cod, herring, mackerel, and sardine fisheries. About the middle of the fifth century a great number of the inhabitants of Great Britain, expelled by the Saxons, took refuge here, and formed the Kingdom of Brittany. Under the sons of Clovis the kingdom was broken up, and partitioned among princes, who took the title of counts. Almost the whole of the department was included in the county of Nantes, which, along with the rest of Brittany, was united to the crown of France at the beginning of the sixteenth century. Loire-Inférieure, for administrative purposes, is divided into five arrondissements—Nantes, Ancenis, Châteaubriant, Paimbœuf, and Savenay; and subdivided into forty-five cantons and 217 communes. Nantes is the capital of the department. Pop. (1881), 625,625.

LOIRET, a central department of France, bounded on the north by the departments of Seine-et-Oise and Seine-et-Marne, east by Yonne and Nièvre, south by Loir-et-Cher and Cher, and west by Eure-et-Loire; area, 2614 square miles. The surface is partly flat, partly undulating, with scarcely any hills, except a low ridge which stretches across its centre, occupied partly by the forest of Orleans, and forming in the east the watershed between the basins of the Seine and the Loire. The latter river, traversing the department east to west, divides it into two unequal portions, the northern of which is the larger, and is fertile and well cultivated, while the southern is bleak and sterile. The rivers, in addition to the Loire, are its tributary the Loiret, from which the department takes its name, and the Loing and the Ossone, tributaries of the Seine. The water communication is much

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extended by the canals of Orleans, Loing, and Briare. Considerably more than one-half of the surface is arable land, generally of remarkable fertility, and admirably adapted for the growth of wheat, which forms the principal crop, and, besides supplying the home consumption, is largely exported. A crop almost peculiar to some of the northern cantons is saffron. The minute attention which its cultivation requires employs a great number of persons, old and young. The vine is extensively cultivated; but none of the wines bears a high name. Various fruits of fine quality are raised, and when dried form a considerable article of commerce. There are several extensive forests, particularly those of Orleans and Montargis. An important branch of rural economy is the rearing of bees. Manufactures have made little progress; but the admirable water communication of the department, and its position, secure it an important trade, which centres at Orleans. It consists in corn, flour, wine, vinegar, brandy, groceries, drugs, fruits, cider, fish, honey, saffron, wool, cattle, wood and charcoal for fuel, ship timber, &c. The ancient inhabitants of the department were the Aureliani and Senones. It afterwards formed part of the empire of Clovis; and on its dissolution was included in the Kingdom of Orleans, one of the four into which that empire was divided. It was ultimately united to the French crown by Hugh Capet. Loiret, for administrative purposes, is divided into four arrondissements—Orleans, Gien, Montargis, Pithiviers; and is subdivided into thirty-one cantons and 349 communes. Orleans is the chief town of the department. Pop. (1881), 368,526.

LOIR-ET-CHER, a central department of France, bounded on the north by the department of Eure-et-Loir, north-east and east by Loiret, south-east by Cher, south by Indre, and west by Indre-et-Loire and Sarthe; area, 2451 square miles. It consists almost entirely of extensive plains, having a slope, however, south-west, only indicated by the course of its rivers. The Loire, to the basin of which the whole department belongs, traverses it centrically, receiving the Cosson and Beuvron; the Loir, with its tributary the Bray, traverses its northern, and the Cher, with its tributary the Sandre, its southern portion. These three principal rivers have all a western direction, and are all navigable. The whole department belongs to the cretaceous formation, and is not rich in minerals. The soil is generally fertile. More than one-half of the whole is arable, and less than one-eighth waste. The latter, where unfit for cultivation, is tolerably well covered with pines. On the fertile tracts the chief products are cereals of all kinds, hemp of fine quality, beet-root for sugar, the ordinary fruits, and wine, both red and white, generally of good name. The pastures and meadows are excellent and extensive, and rear great numbers of horses, cattle, and sheep. The chief manufactures are coarse woollen cloths, worsted, flannels, moleskins, cottons, hosiery, leather, leather gloves, beet-root sugar, glass, porcelain, and earthenware. The trade, which is considerable, includes, besides the articles now mentioned, corn, wine, brandy, and wool; and derives great facilities from navigable streams, and from the Cher Canal. In the time of Cæsar this department was inhabited by the Turones, Carnutes, and Aureliani. In the reign of Charles the Simple it fell into the hands of the Count of Chartres, one of whose successors sold it in 1391 to the Duke of Orleans, afterwards Louis XII. It was thus united to the crown as the county of Blois, and became the frequent residence of the court; a circumstance which accounts for the remarkable number of châteaux with which the department abounds, and probably, also, for the superiority of the language of its inhabitants. It is said that in no part of France is French spoken in greater purity than in the town and neighbourhood of Blois, the capital of the department. For administrative purposes Loir-et-Cher is divided into three arrondissements—Blois, Romorantin, and Vendôme; subdivided into twenty-four cantons and 297 communes. Pop. (1881), 275,713.

LOJA, a town in Spain, Andalusia, in the deep and beautiful valley of the Genil, 25 miles W.S.W. of Granada. It is a very ancient place, and appears from the antiquities found in it to have once been an important Roman station. The streets are steep and very irregular, and the houses, with some exceptions, of mean appearance. The principal edifices are three churches, one of them ancient, and containing a fine monument; a courthouse with a Doric portico, a town-house, a nunnery, and an hospital. The manufactures consist of linen, hempen, and silk goods; leather, earthenware, and chocolate; and there are dye-works, salt-works, and numerous paper and other mills. The town was taken from the Moors by Ferdinand of Arragon in 1486. Pop. 18,429.

LOK. See NORTHERN MYTHOLOGY.

LOKEREN, a town and commune, Belgium, in the province of East Flanders, on the right bank of the Durme, 13 miles E.N.E. of Ghent. Its principal edifices are a spacious church with a lofty tower, a town-house, hospital, and orphan asylum. Its manufactures consist of linen and cotton goods, flannels, serge, lace, ropes, hats, leather, soap, candles, tobacco, and chicory; and the trade both in these and in agricultural produce is considerable. Pop. 17,770.

LOKMAN is a name that figures in the proverbs and traditions of the Arabians. The period at which he lived is very differently stated, so that it is even doubtful if there were not two of the same name at different periods. According to tradition Lokman was a scion from the stock of Ad, and was once sent with a caravan from Ethiopia to Mecca to pray for rain in a time of great drought. But God's anger destroyed the whole family of Ad except Lokman, the only righteous one, whereupon the Creator of the world gave him his choice to live as long as the dung of seven gazelles, which lay in an inaccessible hole in a mountain, should last, or for a period equal to the lives of seven successive vultures. Lokman chose the last, and lived for an almost incalculable length of time. There is also in the Koran an account of a Lokman, surnamed *the Wise*, sometimes also called *Abu-Anam*, or *the father of the Anams*. This one —whether identical with the former or not is not for us to determine—lived at a time anterior to that of King David, and is quoted in the Koran as the type of human wisdom. This person had also a life of remarkable duration (according to some 300, according to others 1000 years), which coincidence in the accounts of them affords good grounds for the conjecture that the Lokman of the Koran and the one whom tradition ascribes to the race of Ad are one and the same person, whose history in the course of years has been thus fancifully adorned. He is represented as the author of a number of fables which bear his name, but which a variety of circumstances prove to be of a later date than the first century of the Hejra, and therefore not the productions of their reputed author. The fables bearing the name of Lokman were for the first time made known to Europe through the press by Erpenius (Leyden, 1615). They were first published in Arabic, with a Latin translation, were afterwards appended to an Arabic grammar, published by Erpenius at Leyden, and have since gone through many editions. Among these may be mentioned those of Marcel (Cairo, 1799; Paris, 1803), Caussin (1818), Freytag (Bonn, 1823), Rödiger (Halle, 1830), Schier (Dresden, 1831; second edition, 1839),

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and Derenbourg (in Arabic and French, Berlin, 1850). The last-mentioned editor has advanced some very ingenious arguments to show the identity of the Lokman of the Koran with the Balaam of the Hebrew Scriptures. The most complete manuscript of the fables of Lokman is in the library of the Vatican, in Persian. Among the oriental nations these fables, owing to their laconic brevity and tasteless dress, are held in little respect, and on the whole are not worthy of the reputation which they have for a long time sustained with us.

LOLIGO, the generic name of the Calamaries (from Spanish *calamar*, from Latin *calamus*, a reed-pen, from their ink-sac) or Squids, familiar members of the Cephalopod or Cuttle-fish class (which see), and which are included in the family Teuthidæ of that division. The Calamaries are two-gilled or *Dibranchiate* Cuttle-fishes; and a familiar species, the *Loligo vulgaris*, or Common Squid, is frequently cast up on our coasts after storms. This animal is much sought after by fishermen as a bait, especially for deep-sea fishing. The body in the Teuthidæ, and in Loligo as a member of that group, is elongated, and possesses lateral and terminal fins of triangular shape; the body thus somewhat resembling an arrow at its hinder extremity. The shell is internal, and is represented by the horny pen-like structures so frequently cast up on the shore. It is known as the *cuttle-pen* or *gladius*, and several of these pens may exist in a single individual. The fourth arm of the left side in the males of the common squid, is modified to form the *hectocotylus* or male reproductive organ. The arms are ten, and provided with suckers, two of the arms being elongated to form tentacles. The characteristic ink-sac is present. Several curious and characteristic species are included in the genus Loligo.

LOLLARDS, a name which arose in the Netherlands about the beginning of the fourteenth century, and which during that and the following century was applied somewhat indiscriminately as a term of contempt to various sects or fraternities deemed heretical by the Roman Catholic Church. Different accounts are given of the derivation of the name and of its first use. According to one opinion the name was first applied to a fraternity formed about the year 1300 at Antwerp, the members of which devoted themselves to the care of the sick and the burial of the dead, and were called Lollards from the Low German *lollen* or *lullen*, meaning to sing in a low tone, from the subdued and plaintive dirges that they were in the practice of singing while accompanying dead bodies to the grave. According to another opinion the name was first bestowed upon the followers of one Walter Lollard, an Englishman, or as others think a Dutchman, who preached peculiar doctrines both in England and on the Continent between 1315 and 1322, till in the latter year he was burned as a heretic. Whatever may have been the origin of the name, it became well known in England about the end of the fourteenth century, when it was applied to the followers of Wickliffe. In the beginning of Henry IV.'s reign an act (*de hæretico comburendo*) was passed with the object of putting them down by persecution. The statutes against them were not repealed till the first year of the reign of Edward VI. (1547).

LOMBARD, PETER, usually known under his Latin name, Petrus Lombardus, one of the most celebrated of the schoolmen, was originally from a village near Novara, in Lombardy, from which he obtained his surname. He was a scholar of Abelard, and according to tradition was the first doctor of the University of Paris. He then became a teacher of theology, and at last, in 1159, Bishop of Paris, where he seems to have died in 1164. In his work Sententiarum Libri Quatuor, which became the subject of almost countless commentaries, and until the Reformation had almost classical authority among theologians, he placed the opinions of the fathers, particularly Augustine, in regard to doctrines under certain titles, and then stated the objections made to them and the answers given by church authorities, but without venturing to give any judgment of his own. This dogmatic method, which the school of the Sententiarists followed, did not save him from incurring the displeasure of the church by some of his decisions. The name of his work has given him the surname of Master of Sentences.

LOMBARDS, LONGOBARDI, or LANGOBARDI. Some derive the name from the long *bards* or spears by which this nation is said to have been distinguished from the other northern tribes; others from the long strips of land (*bærde*) which they inhabited on both sides of the Elbe, from Luneburg to Magdeburg. They are generally considered a German tribe, belonging to the Suevi; but their own historian, Paulus Diaconus, states that they were Scandinavians who had migrated into Germany, and whose original name was Vinili. Their most ancient seats, at least in Germany, were on the west side of the Elbe, in the eastern parts of the principality of Luneburg, and in the Altmark, or the *Bardengau*, so called, which, most probably, takes its name from them. Here Tiberius found them, on his expedition to the Elbe, and fought a battle with them. Strabo narrates that Tiberius drove them beyond the Elbe; but Velleius Paterculus, who himself accompanied the expedition, makes no mention of it. The Lombards afterwards appear in the Marcomannic League, about the beginning of the Christian era, under Maroboduus, but they ultimately concluded a league with the Cherusci, with whose assistance they shook off the yoke of that leader. They appear at this time to have left their settlements on the Elbe and to have approached nearer the Cherusci. The latter tribe, having been weakened by a series of misfortunes, the Lombards improved the opportunity to spread themselves farther and humiliate the Cherusci, took possession of all their settlements north of the Hartz Mountains, and became the most powerful of the nations there. According to the accounts of Ptolemy (middle of second century) they now spread between the Weser and the Rhine, in the territories of the former Angrivarii, Tubantes, Marsi, and Cherusci. For 200 years we hear nothing more of them, till, at the close of the fifth century, they appeared again on the north side of the Danube, and after having obtained a part of Pannonia from the Greek emperor Justinian II., aided by the Avari, put an end, under their king Alboin, in 566, to the empire of the Gepidæ, in Transylvania. The enterprising Alboin now turned his eyes upon Upper Italy, at this time exhausted by famine and pestilence, and owing to the difficulties by which the Byzantine Emperor was then surrounded deprived of the assistance which might otherwise have been expected from that quarter. At the head of the Lombards, who were joined by considerable bodies of Bulgarians, Sarmatians, Pannonians, Noricans, Alemanni, Suevians, Gepidæ, and Saxons, of the last of whom alone there were 20,000, Alboin entered Italy in April, 568, and conquered the northern region, which hence received the name of Lombardy. A few years later (573) Alboin died by assassination, and for at least twelve years after his death great confusion prevailed in the Lombard conquest. This was only put an end to when the Lombards in 585 recognized Antharis as their king by the ceremony of raising on the shield. Antharis approved himself both a warlike and a politic ruler. He drove away the enemies that threatened the new

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kingdom from without, and then solidified his government within by taking measures to gain the goodwill of the subject Roman population and by instituting a better defined system of government than had hitherto existed. He married Theodelinde, the daughter of a Bavarian prince. She had been brought up in the Catholic or orthodox faith, while the Lombards were Arians, and through her influence, both during the reign of Antharis and during that of her second husband Agilulf, whom the Lombards elected to succeed Antharis, the Catholic clergy had a part of the possessions of which they had been despoiled restored to them, and much besides was done towards bringing over the Lombards to the Catholic faith. From Gregory the Great Theodelinde is said to have received a nail from the cross of Christ, which she caused to be made into a ring of iron, and surrounded with gold, so as to form a crown. This is what is known as the Iron Crown of Lombardy, which is said to have been first used to crown her second husband Agilulf, and was subsequently used to crown all who assumed the title of King of Lombardy. The Catholization and Romanization of the Lombards began under the influence of Theodelinde, and continued under her successors. The family of Theodelinde reigned till 702, only interrupted by the rule of Grimvald, duke of Benevento (662–771). The only king of note among the successors of her own family was Rothari, who on the 22d of November, 643, promulgated, under the name of Edictum, a system of laws, which, after being revised, enlarged, and developed by various of his successors, survived the fall of the Lombard Kingdom, and afterwards became among German jurists the basis of the study of law during the middle ages. After the extinction of the family of Theodelinde a period of anarchy followed which lasted for more than ten years, at the end of which time the Lombards received once more a powerful king in the person of Liutprant (713–744), who raised the kingdom to the summit of its power, extending his sway, at least temporarily, over the whole of Italy. From that time the power of the Lombards gradually declined, chiefly owing to the policy pursued by the popes, who feared the predominance of any other power than their own in Italy, and when they saw that the Lombards were becoming too powerful invited foreign aid to check them. Thus when Aistulf, king of the Lombards (749–756), again took up the design of conquering all Italy, and demanded tribute from the Romans, Pope Stephen III. sought the assistance of the Frankish mayor of the palace, Pepin, who in two expeditions into Italy compelled Aistulf to desist from further conquests and to give up some of the towns which he had already conquered. These Pepin gave to the church, and this donation formed the nucleus of the Papal States. On a similar occasion Hadrian I. sought the assistance of Charlemagne against Desiderius, the successor of Aistulf. The assistance was granted, and in 773 or 774, by the capture of Pavia after a six months' siege, Charlemagne put an end to the Lombard Kingdom. Desiderius ended his days in a Frankish monastery. The conquest of Charlemagne was formally recognized by a treaty concluded in 803 between Charlemagne and Nicephorus, emperor of the East, according to which Upper and Middle Italy (except the islands of Venetia) were to fall to the Western Empire, and Lower Italy, Sicily, and the islands of Venetia to the Eastern. There are two native historians of Lombardy—Warnefried, usually known as Paulus Diaconus, who wrote in the time of Charlemagne; and an otherwise unknown writer, who flourished in the ninth century. Both wrote in Latin.

LOMBARD SCHOOL. See Italian Art in the article ITALY, and PAINTING (HISTORY OF).

LOMBARD STREET, a well-known spot in the gigantic metropolis of the British Empire, is situated in the city, and received its name from having been the residence of the Lombards, the money-lenders of former times, whose usurious transactions caused their expulsion from the kingdom in the reign of Elizabeth. It is now chiefly occupied by bankers, and is a place of much importance in the London commercial world.

LOMBARDY, the part of Upper Italy which took its name from the Longobardi or Lombards. (See LOMBARDS.) After the fall of the Lombard Kingdom this territory remained attached to the empire of Charlemagne and his successors till 843, when an independent Kingdom of Italy arose, out of which in process of time a number of independent duchies and marquisates (Friuli, Mantua, Susa, &c.) or republics (Venice, Genoa, Milan, &c.) were formed. These were all regarded as fiefs of the Holy Roman Empire, and during the middle ages they made repeated and in part successful attempts to secure their independence. Divided among themselves they subsequently became the playballs of Austro-Spanish and French politics, and most of them remained constantly subject to some more powerful state. From the time when Austria acquired the duchies of Mantua and Milan these provinces were called Austrian Lombardy, a name which they retained till Napoleon formed in 1797 out of them and other districts the Cisalpine, afterwards the Italian Republic, and at last, in 1805, the Kingdom of Italy. By the Peace of Paris, May 30, 1814, and the act of the Congress of Vienna, dated June 9, 1815, Austria received back its old Lombard possessions; but in consequence of the war of 1859 was compelled to cede them to Victor Emmanuel, king of Sardinia, by the Peace of Zürich, and in the following year they became part of the Kingdom of Italy. Lombardy is now the name of an Italian department (compartimento), embracing eight provinces (Bergamo, Brescia, Como, Cremona, Mantua, Milan, Pavia, and Sondrio), containing an area of 9086 square miles and a population (end of 1881) of 3,750,051.

LOMBOK, an island, belonging to the Dutch, in the Indian Archipelago. It lies between Bali on the west and Sumbawa on the east; about lat. 8° 30′ S.; lon. 116° 20′ E.; is about 50 miles long by as many broad, and has an area of 2393 square miles. It is nearly of a square shape, with a coast containing several good natural harbours, and an interior which is almost wholly volcanic. In the north-east a mountain range, stretching across the island, attains the height of 12,000 feet in Gocnong Rindjanie, a volcano which has only become extinct within a comparatively recent period, while the south is traversed by a similar and nearly parallel range. Between these ranges is an extensively and finely undulating plain, well watered, and generally covered with fields of rice, which is the staple product. Other articles of cultivation are cotton, coffee, maize, and tobacco. In some quarters cocoa-trees form whole forests. Lombok, though again prosperous, suffered dreadfully in 1815 from the eruption of the Goenong Tomboro, in the island of Sumbawa. Though more than 20 leagues distant, it covered its fertile plains with heaps of volcanic ashes, destroying great numbers of the inhabitants, either instantaneously, or by the famine consequent on the destruction of vegetation. These ravages have been so far repaired that the annual export of rice alone now amounts to about 14,000 tons. It forms one colony with Bali (which see). Separate population estimated at 100,000.

LOMÉNIE DE BRIENNE, ÉTIENNE CHARLES DE, cardinal, archbishop, and minister of state in France, born at Paris in 1727; died in 1794. Having embraced the clerical profession, he was in 1763

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made Archbishop of Toulouse, where he acquired the reputation of a cultivated prelate and an able administrator. At the first breaking out of the revolutionary discontents in France, Brienne was among the most active. He was the first to raise his voice against the administration of Calonne, and after the dismission of that minister the partisans of Brienne induced Louis XVI. to place him at the head of the finances. The new financier rapidly fell short of the most moderate expectations, though some excuse may be found for him in the almost inextricable confusion which reigned in the affairs of France at this period. Complaints were soon raised against him on all sides, and in August, 1788, the king found himself compelled to dismiss him. In 1791, as Bishop of Yonne, he took the oath to the civil constitution of the clergy. He was arrested by the revolutionary party in 1793, but was afterwards released on the condition of remaining confined to his own house. He was again arrested in the February of the following year, but he died of apoplexy during the night following his incarceration.

LOMOND, Loch, a fresh-water lake lying within the counties of Stirling and Dumbarton. Its length is about 24 miles; the breadth at the lower or southern end 7 miles, at the upper end considerably under half a mile. For 14 miles from the head the breadth never exceeds a mile and a half. The lake is almost entirely surrounded with ranges of hills; and its surface is studded with numerous islands. The principal hills are on the eastern side, where a branch of the Grampians culminates in Ben Lomond, 3195 feet high, on the very border of the lake. Through the glens intersecting the surrounding hills the drainage of the district flows into the lake by the Falloch, Endrick, Fruin, Luss, and other streams; and the river Leven at the south-western extremity conveys the overflow to the Clyde. The greatest depth is in the narrower part of the lake, where in some parts it reaches 600 feet. Fish, including salmon, salmon-trout, pike, perch, eels, and powana, usually called fresh-water herrings, are abundant.

LONDON (*Londinium, Augusta Trinobantum, Camera Regis*, of the Romans; French and Spanish, *Londres;* Italian, *Londra;* Dutch, *Londen*), the capital of the United Kingdom of Great Britain and Ireland, and the largest city in the world, on the Thames, about 40 miles from its mouth; lat. (St. Paul's Cathedral) 51° 30′ 48″ N.; lon. 0° 5′ 35″ W. On the north bank, where the principal part of London stands, in the counties of Middlesex and Essex, the site rises gradually at the rate of 36 feet per mile, while on the opposite bank the houses cover a nearly uniform and extensive flat, forming part of the counties of Surrey and Kent, and lying in some places several feet below the highest tides. The limits of London are variously taken, according as they have been settled for different purposes. The area included in the ten metropolitan parliamentary boroughs is the smallest area usually ascribed to London. The following table gives the area, population, and parliamentary representation of each of these boroughs according to the census returns for 1861, 1871, and 1881:—

Divisions.	Area in Acres.	Population, 1861.	Population, 1871.	Population, 1881.	Number of Members.
London, City	668	112,063	74,897	50,652	4
Westminster, City	2,546	254,623	246,606	229,238	2
Finsbury, Borough	5,147	387,278	452,484	524,952	2
Lambeth	5,655	294,883	379,048	499,255	2
Marylebone	5,429	436,252	477,552	498,386	2
Tower Hamlets	4,097	336,693	391,790	439,137	2
Southwark	1,090	193,593	208,725	221,946	2
Hackney[1]	4,700	311,152	362,378	417,233	2
Chelsea[1]	7,028	174,280	258,050	366,798	2
Greenwich	8,581	139,436	169,361	207,025	2
Total,	45,841	2,640,253	3,020,871	3,454,625	22

London within the limits settled by the Metropolitan Local Management Act, which is the same as the London School Board district, comprising Bow, Hackney, Clapton, Stamford Hill, part of Highgate, Hampstead, parts of Kilburn and Kensal Green, Acton, and Hammersmith, north of the Thames; and Putney, Roehampton, Tooting, Streatham, the site of the Crystal Palace, Eltham, Woolwich, and Plumstead, south; has an area of 75,462 acres, and a population in 1881 of 3,834,354. The registrar-general's tables of mortality extend over 78,080 acres, with a population of 3,814,571. The metropolitan and city police districts, extending from 12 to 15 miles round Charing Cross, embrace an area of 441,559 acres, with a population of 4,766,661, but even beyond these limits many thickly populated quarters have sprung up. London is one of the healthiest of the large cities of Europe. The annual rates of mortality showed a mean of 24·34 per 1000 of population during the thirty-one years 1840–70. The average of 1840–50 was 26·6; 1850–60, 24·4; 1860–80, 23·2. The annual death-rate is therefore about 2 per 1000 above the rate for all England. The districts to the west and north are the most healthy; and the east and central districts are the least. The birth-rate is about 34 per 1000 persons.

The metropolis stands on alluvial deposits, consisting of beds of clay and gravel, below which is the hard clay stratum known to geologists by the name of 'London clay,' in the middle of the great chalk basin extending from Berkshire to the east coast. The prevailing wind is the south-west, and there are few places in the kingdom where less rain falls. The mean annual temperature is 50° 5′, and the general range of the thermometer is from 20° to 81°; the highest and lowest markings being, for the most part, in August and January respectively. In the beginning of winter London is occasionally enveloped in fogs, which are especially dense in the lower parts. Among the positions from which the best panoramic views of London are to be obtained may be named Highgate Hill on the north, and Blackheath on the south-east side; the top of the Colosseum in Regent's Park, the top of St. Paul's, and of the Monument in the city, and of the Duke of York's column at the end of Waterloo Place. The prospects from the bridges across the Thames are also celebrated. Since the passing of the Metropolis Management Act of 1855 great changes have been made in the condition of London. The gigantic operations of the sewerage of London and the embankment of the Thames, from

[1] Chelsea was not a borough until 1867, and the borough of Hackney was comprised in the Tower Hamlets up to the same year. The population given as that of Tower Hamlets in 1861 is the population then within the limits of the present borough.

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Blackfriars to Battersea on the north side, and from Westminster Bridge to Lambeth on the south, have been completed, and several important lines of streets long previously projected, have been opened. The Metropolitan and Metropolitan Districts Railways, and the various suburban lines, with their intricate but most efficient system of connections, supply means of communication unequalled in the world, and of which it is sufficient to say that it is in a great measure adequate to the wants of the immense population it is designed to serve. In all the districts of London, and particularly in the city, there has been within the same period great improvement in the quality of architectural decoration, and in public buildings particularly, stone has to a considerable extent replaced brick and plaster, although not so far as to change the general aspect of the streets. Although some of the leading thoroughfares are wide, the prevailing character of the streets is narrow and irregular. While this adds some features of a picturesque and antiquarian kind calculated to enhance the interest of historical associations, the merely physical effect is in the highest degree adverse to the display of the proportions of fine buildings, and although the appearance of London is well calculated to strike a stranger, the result of familiarity with it, apart from antiquarian interest, is rather depressing to the æsthetic sense from the general meanness of the common buildings, the absence of every element of symmetry, and the huddled and jostled appearance in the city, and other crowded districts, of the great and fine buildings. The decorative and ornamental expression of the streets about Lombard Street and the Bank has been recently fostered by the growth of numerous banking and insurance companies. By these no spot of ground has been deemed too costly, and no amount of architectural enrichment has been thought excessive, and for some time a sort of rivalry has been apparent, in which some even of the older banking-houses have participated.

London was surrounded with walls by the Romans, and its extent was then probably limited by boundaries corresponding to the end of Leadenhall Street and the top of Ludgate Hill on the east and west, by the river on the south, and London Wall and Little Britain on the north; this part of the city being called 'London within the walls. The walls were restored by King Alfred after the city had been ravaged by the Danes. In the reign of Henry II. the walls on both sides of the river are described in a contemporary account as supplied with numerous towers. 'The City,' at the present day is bounded south by the Thames; it extends north to Charterhouse Square, east to Middlesex Street, and west to Temple Bar. Till 1878 this last boundary was marked by an old gateway, to which the spot owes its name; but in that year this structure being found to be in a tottering condition was removed, as forming an impediment to traffic which could no longer be suffered. A memorial has since been erected on the site. Although in the different districts of London with the exception of the parts most recently built, there are numerous narrow and crooked streets, yet the whole extent of the metropolis is well united by trunk lines of streets in the principal directions, which render it comparatively easy for a stranger to find his way from one district to another. Of the streets that run from west to east, the most important is that which enters on the west from Kew and Kensington, forming the finest of all the approaches to London; it stretches on through Knightsbridge and Piccadilly, with Kensington Gardens and Hyde Park on the north, and with Apsley House and numerous other palatial edifices facing the Green Park, which constitutes its south boundary for about half the length of Piccadilly. This line is broken at the east end of Piccadilly, but passes by Regent Street (or by the Haymarket) and Trafalgar Square into the Strand, which continues it further south and much nearer the river, and it stretches on past the Temple along Fleet Street, Ludgate Hill, St. Paul's Churchyard, where it runs into Cannon Street, leading to the Tower on one side, and on the other into Cheapside, Poultry, Lombard Street, Fenchurch Street, Aldgate, Whitechapel Road, and Mile-end Road to Bow. The next great artery between the west and east extends along Oxford Street, through Holborn and Newgate Street, where it joins the more southern line above described, at the west end of Cheapside. Further north again is a third line, called the Marylebone and Euston Road, extending from Paddington to the City, as far east as Islington, and thence by the Pentonville and City Roads to Finsbury Square. Among the leading thoroughfares running north and south the most western is Edgeware Road, terminating at its south extremity in Oxford Street, from which it runs north-west, but communicating through Park Lane with Piccadilly, a little to the west of which, from Hyde Park Corner Place, Grosvenor Place leads down to Buckingham Palace Road, from whence Vauxhall Road forms a connecting line with the river. Park Lane and Grosvenor Place on this line contain many of the most select residences of the aristocracy. East of Edgeware Road Regent Street with Portland Place, Tottenham Court Road with St. Martin's Lane, and other connecting lines leading to Westminster Bridge; Gray's Inn Road, and the line of Chancery Lane, Farringdon Street, &c., leading to Fleet Street and Blackfriars Bridge, form some of the most important communications in this direction. Piccadilly and Pall Mall, running east and west, Bond Street, Regent Street, and St. James Street, north and south, are among the most fashionable streets in the west end, each with its own distinctive character. Bond Street contains the shops most patronized by the aristocracy. Regent Street, perhaps the handsomest street in London, is the fashionable promenade, and has some of the finest shops. It unites with Portland Place in the north, and intersects Oxford Street and Piccadilly, and reaches south to Waterloo Place, by which it communicates with St. James' Park. The greatest thoroughfare in London, not of an exclusively mercantile character, is the line of the Strand and Fleet Street.

Amongst the street improvements of late years have been the line of Cannon Street—which affords a needed route for the traffic from St. Paul's to London Bridge, the line northwards to Clerkenwell from Farringdon Street, that of Victoria Street, Westminster, the Thames Embankment, and Queen Victoria Street, forming a line from the Victoria Embankment to the Mansion House. The Metropolitan Board of Works, by whom these improvements have been carried out, is a central board of forty-five members, elected by the vestries of the several parishes. The board was created by act of Parliament in 1855, especially for constructing a system of drainage, but was also empowered to alter and widen streets, and to effect other changes, and also to levy rates. The Thames Embankment consists of a wide roadway, with a granite retaining-wall, surmounted by a moulded parapet, broken by pedestals for lamps. There are well-contrived landing-stages in recesses, one at Westminster Bridge, two at the Charing Cross Railway Bridge (above and below the bridge), two at Waterloo Bridge (above and below), and one at the end of Essex Street for the Temple. Each of these several features of the Embankment is made highly ornamental

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by balustrades, pedestals for sculpture, and other features. From the temple to Charing Cross portions of land, reclaimed from the Thames, have been laid out in public gardens. In the adjustment of the line of this Embankment the aim has been to equalize the breadth of the river, and to increase the scour, and so prevent the continued formation of mud-banks, and assist the purification of the stream. In 1874 the Chelsea Embankment, extending from the Albert Suspension Bridge along Cheyne Walk to Chelsea Hospital, was opened to the public. From the new building of St. Thomas's Hospital, next Westminster Bridge, extends the Albert Embankment, continuous with the old quay at Lambeth. Some important street improvements are being carried out in connection with it. A very valuable improvement in the city is the Holborn Valley Viaduct, extending from Newgate Street to the end of Hatton Garden. Broad roads also lead to the New Meat Market, and to the lower level of Farringdon Street, which is crossed by the viaduct obliquely, with three Gothic arches supported on twelve hexagonal columns of polished red granite. Great improvements have been recently effected in the City, especially in the neighbourhood of the Bank and the Exchange, by the opening up of new streets of considerable breadth, and in a very superior style of architecture, especially those that lead from the Bank to London Bridge on the one hand, and to Moorfields on the other. This portion of the metropolis alone possesses a corporation, the oldest, richest, and most powerful municipal body in the world. The City is divided into 108 parishes, of which 97 are called 'without' and 11 'within' the walls —a distinction which is merely nominal, as the walls have long since disappeared. The space which extends down the north bank of the river as far as Blackwall is occupied by the various docks, wharfs, and warehouses, and inhabited by slopsellers, labourers, and sailors. To the north of this district lie Spitalfields and Bethnal Green. Clerkenwell, to the north-west of the City, is the seat of the watch trade, of a large artisan population, and of numerous workshops and factories. On the north the parish of Islington, placed on a salubrious elevation, where new streets and squares of ordinary construction appear in amazingly rapid succession, is mostly inhabited by the middle classes. On the Surrey side Southwark and Lambeth are occupied generally with manufactories. Bermondsey is the great seat of the tanning trade. Wapping, Shadwell, and Rotherhithe, on both sides of the river, are the site of extensive docks and the head-quarters of sailors. The east line of the city of Westminster coincides with the west line of the city of London, the New Law Courts standing at the point of junction in the Strand. The north boundary is Oxford Street, from Tottenham Court Road to Kensington Gardens, and the west limit, passing through the Serpentine in Hyde Park, reaches the Thames at Chelsea Hospital. Marylebone, Finsbury, and Tower Hamlets form a continuous line lying in the north and east of these two cities. The 'west end,' when used in the sense of the fashionable part of London, may be described generally as including the district between Oxford Street on the north, Hyde Park on the west, Regent Street on the east, and Piccadilly on the south; the district (Belgravia) west of Buckingham Palace gardens between Grosvenor Place and Sloane Street; and that between Regent Street and the Green Park (including St. James' Square, &c.). It may even be said to extend as far as Kensington Gardens, embracing part of South Kensington, Bayswater, and the district immediately to the north of Hyde Park. The west end proper, comprising Paddington, Kensington, West Brompton, Bayswater, and Notting Hill, also consists to a great extent of the residences of the wealthier classes. This is one of the most modern parts of London, and the numerous streets, terraces, and squares are laid out with a degree of regularity and symmetry in striking contrast with many of the older portions, but the buildings are chiefly brick covered with plaster. Marylebone, lying to the north of this district, was not long since fashionable, but has greatly declined since the rise of Belgravia, although a few ducal and other aristocratic residents are still to be found in Cavendish and Portman Squares. Still further north lies the Regent's Park district, containing some fine terraces and crescents, and numerous pretty villas. Those who dwell here belong chiefly to the middle classes, among whom are many artists and a number of city merchants. Further north still are Camden Town, Kentish Town, Hampstead, Holloway, Highgate, and north-east are Clapton, Stoke Newington, Hackney, and Dalston. East of Marylebone lies the Bloomsbury district, in which stands the British Museum. Its well-built houses and squares were erected towards the latter part of the last century. Still further east we recognize the architecture of the era of Anne, in the capacious dwellings of Great Ormond Street and Queen Square, where fashion reigned near the beginning of last century. To the south of this line is the Strand district, which is strictly trading, although the streets running out of it towards the river are chiefly occupied by lodging-houses. Westminster proper is one of the poorest and most squalid districts in the metropolis. Pimlico, Chelsea, and Brompton, the districts lying to the west of Westminster, and immediately north of the river, are chiefly residential, and contain a population of a very mixed character. The north-west portion of Pimlico comprises the fashionable district of Belgravia, already mentioned. Brompton, lying north of Chelsea, in a low situation, is resorted to by consumptive patients. The Artisans' and Labourers' Dwellings Improvement Act of 1875 has been adopted by the local authorities of various districts in London, including Southwark, Islington, Whitechapel, Clerkenwell, St. Giles, St. Martin's in the Fields, and Westminster. During the year 1881 26,000 houses and 86 miles of streets were added to the metropolis.

The streets of London are regularly kept clean, and are well lighted and paved. The carriage-way is generally paved with granite, but several streets, such as Regent Street, are macadamized. Wood and asphalte pavements are, however, gradually displacing stone in the more crowded thoroughfares.

Squares and Public Monuments.—The squares of London are numerous, and many of them of great extent, and well planted with shrubbery, which usually thrives well. Among them are Lincoln's Inn Fields, off Holborn; St. James' Square, north of Pall Mall; Leicester Square, lying on the line which forms the continuation of Piccadilly, long a public eyesore, but latterly improved, being formed into a public garden with a fountain, and at the end of 1883 in the midst of extensive alterations for new streets; Eaton, Belgrave (10 acres), Grosvenor, Portman, Cavendish Squares, all in the west end; Russell Square (10 acres), Bedford, Bloomsbury, Tavistock, and Euston Squares, in the north part of the town; Trafalgar Square, at Charing Cross, fronting one of the principal thoroughfares, and adorned with public buildings, fountains, the Nelson Column, and statues of Charles I. and George IV., and others. The most conspicuous public monuments are 'The Monument,' on Fish Street Hill, London Bridge, a fluted Doric column, 202 feet high, erected in 1677 in commemoration of the great fire of London; the York Column,

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at the south end of Waterloo Place, a plain Doric pillar of granite, 124 feet high, surmounted by a bronze statue of the Duke of York; a fluted Corinthian column, in Trafalgar Square, 176¼ feet high, raised in honour of Nelson, and surmounted with a colossal bronze statue of the hero; while the pedestal is decorated with bronze sculptures in high relief, the figures larger than life, and has four magnificent lions, by Sir E. Landseer, at the angles; a colossal equestrian statue of the Duke of Wellington recently stood on the grand arch at the top of Constitution Hill, but it has now been removed. Another of smaller size stands in front of the Exchange, and a statue of Sir Robert Peel at the top of Cheapside. A statue of Sir Charles J. Napier and one of Sir Henry Havelock stand in Trafalgar Square. A seated figure of Dr. Jenner, once in the Square, is now in Kensington Gardens. On the Thames Embankment not far from the Temple now stands Cleopatra's Needle. In Waterloo Place a memorial has been erected to the Guards who fell in the Crimea, and here is also a statue of Sir John Franklin. In Hyde Park a national testimonial has been erected to Prince Albert. A monument to Sir Hugh Middleton, who brought the New River water to London, has been erected on Islington Green. Amongst the more recent commemorative erections are the Westminster Crimean Memorial, in the open space at the west of the Abbey; the Peabody statue behind the Royal Exchange; and an equestrian statue of Prince Albert in Holborn Circus, a statue of Carlyle on Chelsea Embankment, and of Lord Beaconsfield in Westminster Palace Yard.

Gas, Sewerage, and Water.—London is now supplied with gas by four separate companies, with an aggregate capital of above £12,000,000. The new sewerage works of London, with which the Metropolitan Board was charged, were formally opened on the 4th April, 1865. The system consists of lines of intercepting sewers on both sides of the Thames intersecting the old outlets, which are retained for service during heavy rainfalls. It consists of three main lines on the north of the river, at different levels, called respectively the High Level, Low Level, and Middle Level Sewers; and of two on the south side, called High and Low Level Sewers. The lines on the north side converge at the river Lea, whence, after the Low Level sewage has been pumped to a higher level, it flows in three parallel brick-culverts, built in an embankment which is upwards of 5 miles in length, on to the Northern Outfall and reservoir, about 14 miles below London Bridge. On the south side the Low Level sewage is pumped to the higher level at Deptford, whence the whole flows, under Greenwich and Woolwich, to near Crossness Point, 7¾ miles from the Deptford Pumping Station. It has been designed and carried out by Sir J. W. Bazalgette. The total length of the sewers is 82 miles, and the area drained is about 117 square miles. The whole system has cost more than £4,200,000. The area does not include Croydon or Richmond, and many other portions of what is really part of London. It is still a desideratum to dispense with the ultimate discharge of the sewage into the river altogether. Several schemes have been proposed for dealing with the sewage, and one has been put forward for the appropriation of all or part of the northern sewage to the fertilization of the Maplin Sands, on the Essex coast. On the northern side about 10,000,000 cubic feet are now carried down daily, and 4,000,000 on the south side. The metropolitan water-supply has been considerably amended. A recent statement makes the quantity supplied by all the companies amount to 120,000,000 gallons daily. The largest quantity, 22,000,000 gallons, was supplied by the New River Company; and, including this, rather more than half the total supply was drawn from other sources than the Thames. By an act passed in 1852 all the companies making use of the Thames are obliged to draw from above Teddington Lock, that is, above the limit of the tidal flow. Even above Teddington Lock the source of supply is greatly polluted by the sewage of numerous populous towns, and by the drainage of richly-manured land. The supply from other sources is likewise liable to various objections, and the total quantity is inadequate to meet the entire wants of the population. A royal commission sat for some time to consider the subject, and a comprehensive scheme for the supply of the whole metropolis from the mountain districts of Westmoreland or Wales was spoken of. The water is all filtered through layers of gravel and sand before entering the mains.

Bridges and the Thames Tunnel.—Within the limits of the metropolis, and west of the Tower, the Thames averages 1000 feet wide. The bridge lowest down the river, and most important of all, is London Bridge, connecting the city at King William Street with Southwark, at the junction of Wellington Street and Tooley Street. It is an elegant structure of Aberdeen granite, built by Sir John Rennie, after his father's designs. About 500 yards further up the river stands Southwark Bridge, connecting the city and Southwark. It is an iron bridge of three segmental arches, resting on stone piers, erected by the elder Rennie. About half a mile further west the new Blackfriars Bridge connects the city at Bridge Street with Southwark at Great Surrey Street. It has five segmental arches of iron springing from granite piers. The centre arch is of 185 feet span. The details are of Gothic character. Waterloo Bridge, nearly half a mile above the former, is esteemed by many to be the finest in the world. It was constructed of Aberdeen granite by the elder John Rennie, and, including its approaches, supported on semicircular arches, is 2456 feet long; it is perfectly level, and connects the Strand with the Waterloo Road. Westminster Bridge crosses the river at the north end of the Houses of Parliament from Westminster to Lambeth. It has seven elliptical arches of wrought and cast iron. Nearly 1 mile south from the last-named bridge Westminster and Lambeth are again connected by Vauxhall Bridge. The Chelsea Suspension Bridge connects Chelsea and Pimlico on the north side with Battersea Park on the south. The Albert Bridge, opened in 1873, connects the Chelsea embankment with Battersea to the west of the park; and the Battersea Bridge unites Chelsea and Battersea a little further west. There are also six new railway bridges across the Thames. One of the railway bridges, the Charing Cross, has displaced the Hungerford Suspension Bridge, making use, however, of its two piers of brick, whilst adding other piers intermediate, that take the form of iron cylinders. This bridge has a footway on each side, so that the original communication is preserved. Another bridge, belonging to the same line of railway, the line between Charing Cross and Cannon Street, City, is similarly provided with footways. The two railway bridges at Pimlico, which look like one, belong to the London, Brighton, and South Coast Railway Company, and the London, Chatham, and Dover Railway Company. The latter company are owners of a bridge which is close to the new Blackfriars Bridge. The Thames Tunnel, a roadway under the river 2 miles below London Bridge, was commenced in 1825 under the direction of Sir Isambard Brunel, and opened March 25, 1843. It cost £614,000, but it barely paid the expenses of maintenance, and it was sold in 1865 to the East

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London Railway Company. A little higher up the river a subway, lined with iron hoops, connects Tower Hill and Tooley Street.

Palaces.—St. James', erected by Henry VIII., from a design by Holbein, at the foot of St. James' Street, is an irregular, dingy-looking brick building. But it is well adapted internally for royal levees and drawing-rooms, which are held here during the fashionable season. Buckingham Palace, facing the west end of St. James' Park, was built by George IV., and consists, since the erection of the east front, of a quadrangular range of buildings. In the gallery, which is 160 feet long, are some good pictures. The queen resides here several months every year in the spring and summer. Whitehall—The Banqueting House, designed by Inigo Jones in the Palladian style, is the only remnant of the ancient palace of Whitehall; the ceiling, painted by Rubens, is the most extensive work of that artist existing in the country. Kensington Palace, situated in Kensington Gardens, is a plain brick building. Lambeth Palace, on the Surrey side of the river, opposite the Houses of Parliament, has been for many centuries the residence of the Archbishops of Canterbury. It is a brick edifice, and comprises a great variety of styles in architecture, from early English downwards, and contains a library of 25,000 volumes.

The Parks.—Of these the largest and most fashionable is Hyde Park, which lies between the Uxbridge and Kensington Roads, and contains about 400 acres. It has towards the south side a large artificial lake, called the Serpentine, which is spanned by a handsome bridge of five arches, at the entrance to Kensington Gardens. The principal entrance to the park on the south side is by a triple archway close to Apsley House, and within a few yards of that point is the beginning of Rotten Row, a narrow stripe railed off for equestrians, and stretching about 1 mile towards Kensington. Somewhat further north, and on the other side of the Serpentine, is a fashionable drive called the Ladies' Mile, which extends nearly to the bridge before mentioned; and here, on the summer afternoons, may be seen vast numbers of splendid equipages driving up and down, while others make the circuit of the park. On Sunday afternoon it is frequented, for the most part, by an inferior description of equipages, while the foot-path on each side is crowded with promenaders of all ranks—many of the highest. The principal entrance on the north side is at the end of Oxford Street, and is adorned with an elegant arch of white marble, which formerly stood in front of Buckingham Palace. Kensington Gardens, with which Hyde Park communicates at several points, are well wooded and finely laid out. Here carriages are not admitted. Promenaders are very numerous on Sunday afternoons during the season. St. James' Park (83 acres) extends from Buckingham Palace to the Horse Guards, and in its centre is an ornamental sheet of water, studded with islets covered with trees and shrubs, and round which swim a great variety of aquatic fowls. The Green Park, 71 acres in extent, lies between St. James' Park on the south and Piccadilly on the north. Regent's Park, on the north side of London, covers an area of 403 acres. Round the park is an agreeable drive nearly 2 miles long, and an inner circular drive incloses the Botanic Gardens. At the north end are the Zoological Gardens, to which a fine broad avenue leads along the centre of the park, with clusters of trees on each hand, and footpaths ramifying out in all directions. Battersea Park is formed on the south bank of the Thames, opposite to Chelsea Hospital, and cost £200,000. It is resorted to by large crowds on Sunday afternoons. Victoria Park, on the north-east of London, is laid out and planted as a place of recreation for the inhabitants of Spitalfields and Bethnal Green.

The New Palace of Westminster, or the Houses of Parliament, contains the House of Peers and the House of Commons, with the connected apartments and offices. It is a highly decorated structure in the Tudor Gothic style, after designs by Sir Charles Barry. It stands on the left bank of the Thames, between the river and Westminster Abbey, and extends over an area of about 8 acres. The façade, which overlooks the river, is 900 feet in length. The walls are of brick, faced externally with magnesian limestone, and the whole edifice is separated from the river by a terrace of Aberdeen granite. It is panelled with rich tracery, and profusely decorated with statues and shields of arms of the Kings and Queens of England, from the Conquest to the present time. In the south-west angle is the Victoria tower, supported upon four pointed arches 60 feet in height; it is 75 feet square, and 340 feet in height. There is also a tower in the centre, 300 feet high by 60 feet, surmounted by a lantern; and the clock-tower, at the north end of the edifice, with its richly decorated spire, rises 320 feet. The House of Peers is an apartment 97 feet long, 45 feet wide, and 45 feet high; magnificently decorated throughout with carved oak-panelling, a profusion of gilding, paintings in fresco, and richly-stained glass windows. The House of Commons is a somewhat smaller apartment, fitted up in a much plainer style. Paintings in fresco and the water-glass medium, and statues of great statesmen, have recently been added to the internal decorations; and a statue of the architect has been placed on the staircase leading up to the committee-rooms. In Old Palace Yard is an equestrian statue of Richard Cœur de Lion by Baron Marochetti, and a statue of George Canning.

Government Offices.—These are mostly situated in and near Whitehall. The Treasury, Home Office, and Board of Trade occupy one range of buildings, which have been improved by a uniform and handsome façade. The India Office is in St. James' Park. The Horse Guards and Admiralty, which are somewhat nearer Charing Cross, have little to admire in their external appearance. The Ordnance Office, also in Pall Mall, is a plain building. An extensive pile of government offices, for the Foreign Office and the Colonial Offices, has been erected in Downing Street. The style is Italian, and the building exhibits a large amount of decorative detail, part of it in red and other coloured marbles and granites. Some of the public offices are in Somerset House, a spacious and handsome quadrangle, finished in 1782, from designs by Sir W. Chambers; its northern façade, 200 feet in length, faces the Strand; and its southern front, 800 feet long, overlooks the river. It has now also a front towards Wellington Street, designed by Mr. Pennethorne. The Post-office, near St. Paul's, is a spacious and handsome building, completed in 1829, from the designs of Smirke. It is 390 feet long, 130 feet wide, and 64 feet high. Its façade, which is towards St. Martin's-le-Grand, has three Ionic porticoes. A supplemental building for telegraph and other business occupies the opposite side of St. Martin's-le-Grand. It was opened in 1873. Its chief feature is the hall of the telegraph department, 300 feet by 90 feet. The Mint, a stone building of Grecian architecture, finished in 1810, stands on Tower Hill, and occupies about 10,000 square yards.

The Tower.—This celebrated fortress, which doubtless formed the nucleus of modern London, lies on the banks of the Thames, from which it is now separated by a platform, just beyond the liberties of the city. It occupies an area of 12 acres, inclosed within

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a wall surrounded by a ditch, now dry, but in former times filled with water from the Thames. On the south side is an archway called the 'Traitors' Gate,' through which state prisoners were brought from the river. The most ancient part of the existing edifices —the White Tower—was erected about 1078, for William the Conqueror, by Gundulph, bishop of Rochester. It stands near the centre of the quadrangle, round which are placed several other towers, each having its distinctive name. The Tower contains the Wellington Barracks, erected on the site of the grand store-house, burned down in 1841; the jewel-room, a modern edifice, in which are preserved the regalia of Great Britain; the horse armoury, Queen Elizabeth's armoury, and the church of St. Peter-ad-Vincula. Besides its use as a fortress, the Tower was likewise the temporary residence of several Kings and Queens of England.

Places of Worship.—St. Paul's Cathedral, originally founded about 600, has been repeatedly burned down. The last building, designed by Inigo Jones, was destroyed by the great fire of 1666. The present one, on the same site, the greatest and most conspicuous architectural ornament of London, planned and carried out by Sir Christopher Wren, was begun in 1675 and completed in 1710. It occupies the summit of Ludgate Hill. It is 510 feet in length from east to west, while the transept is 250 feet, exclusive of the semicircular portico at each end; the breadth of the west front is 180 feet, and the height of the walls 110 feet. The building is crowned with an immense dome, surmounted by a lantern with ball and cross, the height of the latter being 404 feet from the ground. It is built entirely of Portland stone, and cost £747,954, which was paid by levying a tax on coal. The interior is now being decorated at great cost by voluntary means, according to the original intentions of Wren. Among the monuments it contains are those of Wellington, Nelson, Sir Ralph Abercromby, Sir John Moore, Dr. Johnson, Howard, Sir Joshua Reynolds, and other eminent men of modern times. Near together, under the centre of the dome, lie interred Lord Nelson and the Duke of Wellington. Westminster Abbey, one of the finest specimens of the pointed style in Great Britain, dates from the reign of Henry III. and Edward I., when it was erected on the site of the Saxon minster, founded by Sebert. The beautiful chapel at the east end was added by Henry VII., and at the beginning of last century the upper part of the two towers at the west end were erected from designs of Sir Christopher Wren. It is 360 feet long, and 195 feet wide within the walls. Here our kings and queens have been crowned, from Edward the Confessor to Queen Victoria; and here many of them are buried, some with and others without monuments. In the south transept are the tombs and honorary monuments of great poets from Chaucer down to Campbell, whence it is called 'Poet's Corner;' and in other parts are numerous sculptured monuments to statesmen, warriors, philosophers, divines, patriots, and eminent individuals generally, many of whom are interred within its walls. Of the other sacred edifices in London the most remarkable are St. Bartholomew's in West Smithfield, which contains some fine specimens of Norman, early English, and later styles of architecture; St. Saviour's in Southwark, which boasts of the best early English architecture in London in its choir and lady-chapel, the only portions of the old church which remain; St. Stephen's Walbrook, the interior of which is extremely fine, and generally regarded as one of Wren's best works; and the Temple Church, which combines transition Norman architecture with early English, the latter in the choir, which was founded in 1240. Important restorations in this church, commenced in 1840, have been completed at a cost of £70,000. Besides these many of the older parish churches are elegant structures: among those worthy of being specified are Bow Church, St. Bride's in Fleet Street, and St. Martin's-in-the-Fields. Those built in more recent years are chiefly adaptations of the Gothic, and give favourable indications of a return to a purer taste. Of the Roman Catholic churches in London the largest is that called St. George's Cathedral, in Southwark, finished in 1848. The additions to the churches in London have of late years been numerous, particularly in the suburbs, and many of them are elegant and costly specimens of architecture. The prevailing style is Gothic, continental models being frequently followed in details. Many of the Dissenting churches are also tasteful structures. Among the finest of them are the new City Temple on the Viaduct, opened for divine service in May, 1874; and the Apostolic (or Irvingite) church in Gordon Square, which can only be compared with an early English Gothic cathedral for its plan, its dimensions, its character, and its amount of decoration. The Tabernacle, Newington Butts, erected for the Rev. C. H. Spurgeon, is said to be capable of accommodating 5000 persons or more. It has a classical portico.

Public Buildings in the City.—In the course of the reconstructions in the city, already noticed, many old and familiar landmarks have been removed. The once famous East India House in Leadenhall Street, a structure of no ordinary historic interest, and the Excise Office in Broad Street, have been replaced by immense piles of offices; Doctors' Commons has been cleared away for the new street to the Mansion House; Sir C. Wren's well-known College of Physicians is supplanted by butchers' shambles; the site of the Steel-Yard, memorable in the history of old London, is absorbed by the city terminus of the South-eastern Railway; three or four of the churches have been levelled, and most of the old coaching inns and hostelries have disappeared; whilst outside the city a whole region full of good and bad memories has been cleared away for the new Law Courts; the State-paper Office is displaced by the Foreign Office; Tattersall's is crossed by streets; chambers occupy the ground of the Old Thatched House; and a gymnasium has supplanted the British Institution. A number of the most important buildings in the metropolis are situated within the city. The nucleus of the whole is formed by the Bank of England, the Royal Exchange, and the Mansion House, which all face towards an open area, the centre of bustle and business, near the middle of the city, which is further adorned with the handsome offices of several assurance companies. The Bank of England, in Threadneedle Street, was built in 1732. It has since that period received various additions and improvements, and recently an increase of height in its centre, and now forms a low, flat, insulated, irregular parallelogram, covering 4 acres of ground. The Royal Exchange is an extensive and ornate building, having a Corinthian portico surmounted by a pediment enriched by sculpture. It surrounds an open interior quadrangle, in the centre of which is a marble statue of Queen Victoria by Lough. In this court, which is surrounded by covered arcades, the meetings of the merchants on 'Change are held. An equestrian statue by Chantrey of the Duke of Wellington occupies the area in front of the building. The Royal Exchange was originally founded by Sir Thomas Gresham in 1567, and having been burned down in 1666, it was rebuilt, and opened in 1669. This second exchange having been also burned down on January 10, 1838, the present edifice was erected on its site. The exchanges for special purposes are the Stock Exchange in Capel Court; the

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Coal Exchange, Lower Thames Street, built by J. B. Bunning, opened on October 30, 1849, by Prince Albert. It is a sumptuous, though rather incongruous building, the great hall of which is circular, 60 feet in diameter, and 74 feet to the apex of the glazed dome with which it is covered; the Corn Exchange, in Mark Lane, is a Doric structure, opened in 1747, enlarged and partly rebuilt in 1827, and now again almost entirely rebuilt. The Mansion House, the residence of the lord-mayor while he holds the office of first magistrate of the city, was built in 1739–53 from the designs of Dance, the city surveyor, at a cost of £71,000. It has a Corinthian portico in front. The Guildhall, situated at the north end of King Street, Cheapside, is the civic parliament-house, where the principal business of the corporation of the city of London is conducted. The civic banquets are given here. This edifice was erected at different periods, but has been recently elaborately restored. The hall itself is now covered with an open timber roof of the decorative character of the 'perpendicular' Gothic period, whilst the old front has been removed and replaced by a new Gothic front. The hall, an immense room in which 3000 persons can dine, contains some monuments of ordinary sculpture; and at the west end, raised on pedestals, are the well-known colossal figures of Gog and Magog. In 1872 a handsome suite of rooms was added to the Guildhall for the reception of the Corporation Library and Museum, and thrown open to the public. The library consists of upwards of 40,000 volumes. Among the changes which have been made of late years some of the city companies have remodelled or rebuilt their halls. Of these the Clothworkers' Company have produced the most elaborate street façade, of which the late Mr. S. Angell was the architect, and it is in the Cinquecento Italian style. Its situation in Mincing Lane, one of the many narrow defiles in which much of the fine architecture of the city has recently been produced, does not permit it to be seen to advantage. Amongst the banks that of Messrs. Robarts, Lubbock, & Co., in Lombard Street, may be reckoned as almost a solitary exception to the mistaken system of extensive ornamentation of upper stories in narrow streets. There are three or four spots where several of the fine buildings of the city come into the field of view very effectively. Such points are the western end of King William Street; one of the resting-places in the middle of the street, opposite the Mansion House; either end of Bartholomew Lane, by the Bank; the north-eastern angle of the exchange, looking in any direction; and the eastern end of Cornhill. From the last-mentioned point is seen the National Provincial Bank of England, the banking-room of which is the largest and at the same time the most effectively treated room of the kind in the metropolis.

Civic Corporation and Government.—The chief civic officer of London is the lord-mayor, annually elected from among the aldermen who have been sheriffs, on September 29, and installed in office on November 9, when a procession takes place, called the Lord-Mayor's Show. The court of aldermen consists of twenty-six members, including the lord-mayor. They are chosen for life by the ratepayers of the twenty-six wards into which the city is divided, each being the representative of a separate ward. They are properly the subordinate governors of their respective wards, under the jurisdiction of the lord-mayor, and preside in the courts of Wardmote for the redress of minor grievances. The sheriffs, two in number, are annually chosen by the livery or general assembly of the freemen of London. The common council is a court consisting of 206 representatives returned by twenty-five of the wards in proportion to their relative extent; the 26th, or Bridge Ward Without, being represented by an alderman. The general business of this court is to legislate for the internal government of the city, its police, revenue, &c. The recorder is generally a barrister of eminence, appointed for life by the lord-mayor and aldermen as principal assistant and adviser to the civic magistracy, and one of the justices of Oyer and Terminer. The livery of London is the aggregate of the members of the several city companies, of which there are seventy-five, embracing the various trades of the metropolis. Of the city companies twelve are termed great companies, and from one or other of them the lord-mayor was formerly chosen. In order of precedence they are—The Mercers, Grocers, Drapers, Fishmongers, Goldsmiths, Skinners, Merchant Tailors, Haberdashers, Salters, Ironmongers, Vintners, Cloth-workers. Many of the companies are very rich, and possess large halls. The Goldsmiths' Hall, behind the Post-office; the Fishmongers' Hall, near London Bridge; and the Ironmongers' Hall, in Fenchurch Street, are very elegant structures.

The Metropolitan Police.—The organization of the present effective police force is due to Sir Robert Peel's bill of 1829. The force is divided into the city police, confined to the city proper, whose office is in Old Jewry; and the metropolitan police, which consists of over 11,000 men, and whose chief station is in Scotland Yard, Whitehall.

Courts of Law.—London is the seat of the supreme courts of the kingdom. The court of ultimate appeal is the House of Lords, but the highest court of law, properly so called, is the Supreme Court of Judicature, consisting of the court of appeal and the High Court of Justice, the latter comprising the Courts of Chancery, Common Pleas, Queen's Bench, Exchequer, &c. Several of these courts had long been accommodated at Westminster Hall (formerly sitting in the hall), but have now been removed to the New Law Courts at the junction of the Strand and Fleet Street. This great building, from the design of the late G. E. Street, occupies an area of nearly four acres. It is of a somewhat heavy mediæval character, a large western tower being a chief feature. Westminster Hall, which was built by William Rufus, is 290 feet long. It was formerly used for great state trials; it now serves merely as a promenade for lawyers during the sitting of the courts. The Old Bailey, adjoining Newgate, is the central criminal court for the trial of prisoners who have committed serious offences in the metropolitan district. One or more of the judges in Westminster Hall sit here also in the old court, while the new court is presided over by the recorder and common serjeant of the city of London. There are numerous county courts within the metropolis and its immediate neighbourhood for the trial of small-debt cases. Beside the above there are also the Clerkenwell Session-house; the city police-courts, which are held at the Mansion House and Guildhall, and are presided over by the lord-mayor and one of the aldermen; and numerous courts connected with the metropolitan police, each of which is presided over by a barrister of at least seven years' standing. The Inns of Court, as they are called, are four: Inner Temple, Middle Temple, Lincoln's Inn, and Gray's Inn. Every law student, before he can be called to the bar, has to be entered as a member of one of these inns, and to dine a certain number of times in the common hall. The Inner and Middle Temple are close to Temple Bar, between Fleet Street and the river. The roof of Middle Temple Hall, built in 1572, is considered the best specimen of Elizabethan architecture in London. Subordinate to the Temple are Clifford's, Clement's, Lyon's, and New Inn. Lincoln's Inn is situated between Chancery Lane and the extensive square

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called Lincoln's Inn Fields. A handsome hall and library in the Tudor style, from the designs of Hardwick, have been erected in the gardens. Subordinate to Lincoln's is Furnival's Inn in Holborn. Gray's Inn stands on the north side of Holborn, and has attached to it two inns of chancery, Staple Inn and Barnard's Inn. The gardens, first planted about 1600, were a fashionable promenade in the time of Charles II., and for some time after.

Prisons.—There are altogether about a dozen criminal prisons. The most celebrated of these is Newgate, near St. Sepulchre's church, a gloomy and massive structure, the scene of a great many executions. We should also mention Brixton Prison, at Brixton Hill, for female criminals; Clerkenwell Prison, belonging to the county of Middlesex; the house of correction, Cold Bath Fields, a very extensive brick building, near Gray's Inn Lane, with spacious courts and airy grounds, where the silent system is followed, and a large treadmill employs 320 at a time; Millbank Penitentiary, or Prison, as it is now called, an immense brick edifice with external walls inclosing upwards of 16 acres, designed by Jeremy Bentham, said to have cost £500,000 sterling; Holloway Prison for criminals and debtors; the Westminster House of Correction, for female prisoners, in Tothill Fields, built on the Panopticon principle, with a court-yard in the centre 250 feet in diameter, and which is conducted on the silent system; the Model Prison, Pentonville, containing 1000 cells, and in which the inmates are taught useful trades.

Clubs.—Many of these establishments, having most elaborate and ornate buildings, form among the principal architectural features of the metropolis. They are situated chiefly in the west end, in and near Pall Mall, and vie with each other in elegance and luxury. The principal ones are the Athenæum, possessed of a fine library, and having a great many artists and men of science and letters among its members; the Army and Navy, the United Service, the Guards', and the Junior United Service; the Carlton, the great Tory club, standing side by side with the Reform Club in Pall Mall, the former numbering above 1600 and the latter 1400 members; the Junior Carlton, the Oriental, the Travellers', Brooks', one of the oldest of the clubs, and the rallying point for the Whig party; White's, also a very old club, frequented chiefly by the Conservative nobility; the Conservative; the Oxford and Cambridge; the Garrick, frequented by lovers of the drama; the Union, in Cockburn Street, Trafalgar Square; and the City Carlton and City Liberal, in St. Swithin's Lane and in Walbrook.

Theatres, Public Halls, and Places of Amusement.—The principal theatres are Covent Garden, opened in 1858, at a cost of £80,000, and seated for about 3000; Her Majesty's Theatre (Italian Opera House), Haymarket, seated for about 3000; Drury Lane (which see), the Haymarket, Sadler's Wells (which was entirely rebuilt in 1879); the Princess's, the Lyceum, the Strand, the Adelphi, the Surrey, Gaiety, Globe, Opera Comique, Pavilion (seated for 3500), Standard, Vaudeville, Royal Court, Astley's, Toole's Theatre, the Savoy, and the Avenue, the last two being new. One of the most important buildings used for purposes of public entertainment, the Alhambra Palace in Leicester Square, designed as a reproduction of Saracenic architecture, was burned down in December, 1882. It had not long previously been licensed as a theatre after being for some years occupied as a music-hall. A new theatre is rebuilt on its site. Exeter Hall, in the Strand, capable of containing 3000 persons, is now occupied by the Young Men's Christian Association, and is used also for the annual May meetings of the different religious societies. St. James' Hall, remarkable almost entirely for its interior, is chiefly devoted to musical entertainments of a high class. Hanover Square Rooms were once famous as concert rooms. The Freemasons' Hall, in Great Queen Street, has lately been burned out. The Congregational Memorial Hall, and the Agricultural Hall, Islington, the largest covered area in London, are among the most important erections of this kind in recent years. There are numerous music-halls in London, where of course the entertainment is not of a very elevated description. Cremorne and other similar gardens are now no more. The Crystal Palace and Alexandra Palace are mentioned below.

Museums and Galleries.—The British Museum, founded in 1753, in Great Russell Street, is a spacious and imposing edifice, with an Ionic façade and sculpture in the pediment, built between 1823 and 1857. It contains an immense collection of books, manuscripts, engravings, drawings, sculptures, coins, minerals, stuffed animals, fossils, preserved plants, &c., and a magnificent collection of Egyptian, Assyrian, Etruscan, Greek, and other antiquities. In Greek, in Assyrian, and perhaps also in Egyptian antiquities, this collection is not surpassed by any in Europe. The reading-room is a noble building of a circular form, 140 feet in diameter, with a domed roof 160 feet high. (See BRITISH MUSEUM and LIBRARIES.) An extensive building has been erected in the South Kensington quarter, for the accommodation of the very extensive Natural History collections. This building is about 650 feet long and has cost over £150,000. The museum of the Royal College of Surgeons, on the south side of Lincoln's Inn Fields, a rather handsome building erected at a cost of £40,000, contains some curious skeletons and surgical preparations. The Soane Museum, on the north side of Lincoln's Inn Fields, possesses many valuable objects, consisting of books, paintings, prints, MSS., drawings, maps, models, plans, &c. The South Kensington Museum contains many valuable collections arranged with great care for purposes of instruction, in connection with which are the schools and head-quarters of the Department of Science and Art. South Kensington Museum has become a most important institution, and a capacious edifice has been provided for its several purposes. (See SOUTH KENSINGTON MUSEUM.) In connection with the great institution at South Kensington, museums, partly from private funds, have been established at Bethnal Green, and in South and North London. The chief picture-gallery in London is the National Gallery, on the north side of Trafalgar Square. Though inferior to some of the continental galleries it is still a very valuable collection. It contains about 1100 paintings, acquired partly from donations, partly by purchase; in the former class are a great number of paintings and drawings by Turner. (See NATIONAL GALLERY.) The National Portrait Gallery is a collection of over 500 portraits, busts, and medallions, at South Kensington, brought together since 1858. The Royal Albert Hall of Arts and Sciences, a memorial to the late Prince Consort, is a huge building between the Horticultural Gardens and the Kensington Road. It was erected for the purpose of holding national and international congresses, for purposes of science and art, musical performances, exhibitions, &c. It is chiefly used for concerts, and is capable of accommodating an audience of 8000, while the orchestra itself accommodates 1000 performers. The building also contains a picture-gallery. In Hyde Park, immediately opposite this building, is another memorial of the prince, which is probably the most splendid, and certainly the most costly monument of recent times. A colos-

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sal statue of the prince, seated, is placed beneath a magnificent shrine, elaborately sculptured and adorned, and terminating in a cross about 170 feet above the ground. Burlington House has been granted to the Royal Academy, and a suite of rooms built in the rear of it for exhibitions; the north end of the grounds has been assigned to the London University, for which, and for the Royal Geographical Society and various other scientific societies, a suitable edifice has been erected, with its principal front towards Burlington Street. Near the South Kensington Museum and the Albert Hall are the gardens of the Royal Horticultural Society, which also possesses a garden at Chiswick. These gardens are inclosed by arcades executed in ornamental brickwork and terra-cotta; and at the northern end of the ground are terraces, a cleverly designed conservatory, and a monument to commemorate the Exhibition of 1851, of which the chief feature is a statue of the Prince Consort. Part of the ground was the scene of the International Exhibition of 1862.

Crystal Palace.—The Crystal Palace at Sydenham, about 7 miles from London, was formed to a considerable extent of the materials of the exhibition building of 1851, removed from Hyde Park. The nave has an arched roof, to the support of which columns placed at regular intervals contribute. There are three transepts, the centre one 120 feet wide and 194 feet high. The building is 1608 feet in length. It contains terraces, fountains, and has several wings, also watertowers, and the extensive grounds contain numerous objects of interest. It was originally designed as a great educational museum of art, and natural history and ethnology; and its gardens and fountains were to rival or surpass those of Versailles. This intention in the matter of art was carried into effect by the provision of the finest collection of casts of architectural ornament and sculpture in the world. These were brought together chiefly by Mr. Owen Jones and Mr. M. Digby Wyatt, who designed the principal 'courts'—Egyptian, Greek, Roman, Alhambra, Byzantine, Medieval, Renaissance, and Italian—and arranged the specimens in them. The Pompeian house was produced under the general direction of Mr. Wyatt, and the Assyrian court under that of Mr. Layard and Mr. Fergusson. The paintings in the Pompeian house were produced under Signor Abbate's direction. M. Bonomi assisted in the Egyptian court. Mr. Waterhouse Hawkins produced the restored figures of extinct animals in the grounds. No expense was spared to insure accuracy. The courts appropriated to manufactures were designed by various architects. Of late years music has taken an important place in the arrangements of the Palace, and an orchestra, extending over the entire breadth of the centre transept, was constructed previous to 1862 for the great Handel festival of that year. Of late, however, entertainments of merely amusing character have been largely introduced. But at the same time lectures and classes have been instituted, there has been provided an excellent library and reading-room, and the exhibition of objects of interest has been sedulously attended to; and thus the Palace has been so much appreciated as to have been a chief cause of the growth of the suburban district connecting London and Croydon, and which comprises Sydenham, Norwood, Anerley, Forest Hill, Dulwich, and other once separate villages. On 30th December, 1866, fire destroyed the north end of the building, called 'the tropical department,' including the north transept; the Alhambra and Byzantine courts were seriously injured, and the library, the Indian museum, and other collections, and the more valuable zoological specimens, were destroyed.

A similar building is the Alexandra Palace, occupying a conspicuous site on Muswell Hill, six miles north of London, and commanding extensive views of the surrounding country. Built at first of materials from the exhibition building of 1862, it was burned down in the summer of 1873, but rebuilt in six or seven months by the contractors who had erected the former structure. The main feature of the new building is a grand central hall, about 400 feet in length by about 200 feet wide. The building has, however, never been a permanent financial success, and has now been closed for some time. The picturesque park in which it is situated contains about 300 acres, laid out as a race-course, cricket, and bicycling grounds, a lake, a trotting track, &c.

Scientific Institutions, &c.—The chief learned institutions are, the Royal Society, Somerset House, which was founded in 1660; the Society of Antiquaries, in the same building, originally founded in 1572; the Royal Academy of Arts, in Trafalgar Square, founded in 1768; the Royal Academy of Music, founded in 1822; the Royal College of Physicians, at the north-west corner of Trafalgar Square, founded by Linacre, physician to Henry VIII., in 1518, the present building of which was finished in 1825; the Royal Geographical Society, founded in 1830, with a choice geographical library and large collection of maps; the Institution of Civil Engineers, established in 1818; the Royal Institute of British Architects, founded in 1834, and possessing a good library of architectural works; the Royal Institution of Great Britain, Albemarle Street, established in 1799; the Geological Society, in Somerset House, established in 1807.

Educational Institutions.—At the head of these stands the University of London (see LONDON, UNIVERSITY OF), with which are associated University College and King's College (see the separate articles). There are likewise two Episcopalian theological schools, an English Presbyterian, a Baptist, an Independent, a Unitarian, and a Jewish; and several schools for medicine, botany, chemistry, geology, &c. Of the numerous endowed schools the most noted are, St. Paul's School, which provides a free education for 153 boys, the most advanced of whom are sent to Oxford and Cambridge, with exhibitions of about £50 to £120; the Merchant Tailors' School (now in the Charter-house School buildings, see CHARTER-HOUSE), founded in 1561, which furnishes a very efficient education gratis to 100 boys, and to 150 others at low fees, and has 43 fellowships in Oxford and 7 in Cambridge; Christ's Hospital, Newgate Street (see separate article); Westminster School, founded by Queen Elizabeth in 1560. Besides the above, and numberless private schools, there are the middle class schools, Finsbury, with 1200 boys, many free schools, schools of the National Society and British and Foreign School Society, and more than 300 schools erected by the School Board.

Hospitals and Charitable Institutions.—London abounds with hospitals for the cure of disease, lying-in charities, asylums for orphans, and other institutions of a like nature. Among these are, St. Bartholomew's Hospital, in West Smithfield; Guy's Hospital, Southwark; St. George's Hospital, near Hyde Park Corner; the Middlesex Hospital, founded in 1745; Westminster Hospital, Charing Cross Hospital, King's College Hospital, University College Hospital, &c.—there are medical schools attached to the above institutions; St. Mary's Hospital, Paddington; the Great Northern Hospital, in the Caledonian Road; the Cancer Hospital, in the Fulham Road; the German Hospital, Dalston; and the Small-pox Hospital, Highgate Hill; St. Thomas' Hospital, Lambeth, opposite the Houses of Parliament, occupying a new and splendid range of buildings, opened

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in 1871; Bethlehem Hospital (Bedlam), in St. George's Fields, south of the river; St. Luke's Hospital, also for insane patients; the Foundling Hospital, rather an asylum for illegitimate children generally than an hospital for foundlings, Chelsea Hospital, Greenwich Hospital. Several of these institutions will be found noticed in separate articles.

Cemeteries.—Extramural interment is of very recent date. Kensal Green Cemetery, in which several royal personages have been buried, was opened in 1832; it occupies about 48 acres of ground, and is tastefully planted and laid out. The cemeteries at Brompton, Kensal Green, Highgate, Abney Park, the Tower Hamlets, Bethnal Green, Nunhead, and Norwood are the only 'intramural' places in which interments are permitted, excepting in the case of interments in St. Paul's and Westminster Abbey; and some of the cemeteries named would now be closed were they not provided with their special acts. A large cemetery has been formed near Woking, in Surrey, by a company. The bodies, with the mourners, are conveyed by railway trains, separate from the ordinary traffic, on the South-Western line, from a distinct station in the Westminster-Bridge Road, and by a branch line into the cemetery itself. The whole ground amounts to more than 2000 acres. At the Woking cemetery the poor of several of the London parishes are buried; but some of the parishes, as Marylebone and St. Pancras, and Paddington, have their own cemeteries. The City of London Cemetery is at Ilford, in Essex. The Great Northern Cemetery, near Colney-Hatch, is similar in its arrangements to the Woking Cemetery. The bodies are taken by the Great Northern Railway.

Means of Conveyance.—This is of two kinds, internal and external; the former by means of omnibuses, cabs, tramway cars, steamboats, and railways; the latter by canals, railways, and the Thames. Numerous small steamers ply on the Thames, affording means of communication to all points of the river between Richmond and Woolwich, a distance of 18 miles. The principal stations are the Great Eastern, Liverpool St., Bishopsgate; the London and North-Western, Euston Square; North London, Broad Street; Great Western, Paddington; the Great Northern and Midland, King's Cross; Midland, St. Pancras; South-Eastern, London Bridge, where there is a congeries of stations, Charing Cross and Cannon Street; London, Chatham, and Dover, Ludgate Hill. The Victoria Station, Pimlico, accommodates the London, Brighton, and South Coast Railway, London, Chatham, and Dover, and West End and Crystal Palace, and is contiguous to Great Western and Metropolitan Stations; the South-Western terminus is at Waterloo Bridge. Many of these stations communicate by the Metropolitan and District Railways, two distinct systems, but both popularly known as the 'Underground,' affording means of internal communication within the city. Many of them are elaborate piles of costly architecture, and have associated with them large and handsome hotels. The Thames also affords communication by steam vessels with the most important points on the British and continental coasts, as well as with all parts of the world.

Markets.—These are numerous, but have generally little to attract, either in external beauty or in internal arrangement. The principal ones are Billingsgate for fish; Farringdon for vegetables and fruit; Covent Garden for vegetables, fruit, flowers, and plants; Leadenhall for poultry, game, &c.; Deptford for foreign cattle. Newgate dead meat and poultry market has been removed to Smithfield, to the site of the Cattle Market before removed to the Caledonian Road. The new Smithfield Market extends over the line of the Metropolitan Railway. Meat and poultry are now brought to it in large quantities by railway. Trucks from the Great Western, Great Northern, and other lines, pass under openings in the floor of the market, and their contents are raised. Mr. Horace Jones was the architect of the new building. The market in the Caledonian Road was designed by the late Mr. J. B. Bunning, city architect, and predecessor of Mr. Jones. It was opened in 1855, cost nearly £600,000, and occupies 74 acres. Leadenhall Market has recently been partly rebuilt.

Hotels.—The Grand Hotel, Trafalgar Square, occupying the site of old Northumberland House, is one of the most important, and is very attractive. There are large hotels at Charing Cross and Cannon Street, in connection with the South-Eastern, and at St. Pancras in connection with the Midland Railway. Also connected in some manner with railways are the Great Western Hotel at Paddington; the Great Northern Hotel at King's Cross; the Grosvenor Hotel at Pimlico; and De Keyser's immense hotel at Blackfriars. Besides these there are the Langham Hotel, Portland Place; the Westminster Palace Hotel, in Victoria Street; the Salisbury Hotel, in Salisbury Square, Fleet Street; and the First Avenue, in Holborn near Gray's Inn.

Manufactures.—It would be almost endless to specify the different kinds of articles manufactured in London. It contains among the largest breweries, distilleries, and sugar-refineries in the kingdom; was long the principal seat of silk-weaving; has extensive manufactures in metal, including machinery of all kinds, plate, jewelry, watches, and brass-work, and an enormous production of books and prints. Millinery, the making of clothes and slops, and of boots and shoes, are also extensive branches of industry. Besides these there are cabinet-making, coopering, coach-building, leather-working, hat-making, ship-building, rope-making, mast-making, &c., all of which are departments of manufacture conducted on a large scale; and there are numerous extensive chemical works, soap manufactories, and dye-works.

Commerce, Docks, &c.—The port of London extends from London Bridge to a little below Blackwall, and is divided into the Pool, Limehouse Reach, Greenwich Reach, Blackwall Reach, and Bugsby's Reach; it is under the care of the corporation of the city as conservators. The docks, some of which are of great extent, are surrounded by wharves, sheds, store-houses, vaults, and warehouses of the most spacious kind. St. Katherine's Docks, London Docks, the West India Docks, and the East India Docks extend along the north bank of the river, at intervals from the Tower to Blackwall; and on the south bank, between Rotherhithe and Deptford, are the Commercial Docks. The tide rises 18 feet at springs, and 14 feet at neaps, at the London Docks; and the depth at low water, spring-tides, on the outer sill of St. Katherine's Docks, the deepest in the port, is 10 feet. The largest is the West India import dock, 2600 feet long, 500 broad, and capable of containing 204 vessels of 300 tons each. Additions have been made to some of the older docks, but they are small works compared with the formation of the Victoria Docks. These are situate near Plaistow, below Blackwall, and occupy about 200 acres of the marsh land. The basin is about 90 acres in area, and the wharfage is more than a mile in length. The Victoria Docks were opened in 1855. Besides these there are the Millwall Docks, in the Isle of Dogs, and an extension of the West India Docks. Docks also are being formed at Dagenham, below Barking Creek, and at Tilbury. The Commercial Docks, south of the river, towards Deptford, now extend over 150 acres; and the 'ponds' will float

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50,000 loads of timber. The vessels belonging to the port in Dec. 1882 numbered 1609 sailing, and 1135 steam; aggregate tonnage, 1,146,142. Its foreign exports in 1850 amounted to £14,137,527; in 1882 to £58,585,803; the imports to £142,507,974. The amount of customs revenue received in 1882 was £9,995,755. The value of the imports is about one-third, of the customs revenue about one-half of the whole amount for the United Kingdom. The following table gives particulars for 1882 of the shipping entering and clearing at the port of London, from and to foreign countries, and British colonies, and coastwise; the tonnage cleared coastwise in ballast not being included:—

	Entered.			Cleared.		
	Sailing.	Steam.	Tonnage.	Sailing.	Steam.	Tonnage.
Foreign	2,898	5,884	4,372,005	2,428	4,359	3,120,601
Colonial	1,584	688	1,758,022	621	1,525	1,525,050
Coasting	29,936	6,179	4,291,447	9,421	2,158	1,475,319
Total	34,418	12,751	10,421,474	12,470	8,042	6,120,970

For East and West India produce London is the great port; tea, sugar, tobacco, wine, corn, timber, tallow, hides, wool, and drugs, form large items on the list. A large quantity of the foreign imports are re-exported. The custom-house is a large building by the river side, between London Bridge and the Tower; the long room, where public business is transacted, is 185 feet long, 66 feet wide, and 55 feet high.

Sources of the Support and Growth of the Population of London.—The vast size of London makes it a question of unusual interest how its enormous population is supported. The support of the population is necessarily associated with the growth of the city; and if contrary to a common notion we assume, as there is every reason to do, that there is nothing abnormal in the growth of London, the question becomes important as well as interesting, affording the highest illustration of the law of growth and limitation to which cities are subject, as well as giving some indications of the future prospects of the metropolis itself. That the growth of London is not abnormal may be assumed from the fact that it can be satisfactorily explained from ordinary causes. The prosperity of London is the direct result, and one of the best indices of the material prosperity of the kingdom, of which it is the capital; its immediate causes will be best seen from an enumeration of the present sources of support of its population. London has enjoyed the double advantage of being the capital, and a seaport on one of the largest rivers of the greatest trading nation in the world. One of the earliest sources of its prosperity was its commerce, and this alone would probably have made it a great city, although not the city it has become. London is at present, first of all, the monetary capital of the world; the extent of its commerce in other respects may be estimated from the statistics already given. It would be a mistake, however, to suppose that the commerce of London contributes to the actual support of its population in anything like a direct proportion to its apparent magnitude. For a large part of the enormous traffic which passes through it London is a mere entrepôt, and its toll upon it must be light, or the traffic would be altogether diverted. Besides, a large portion of the actual revenue drawn from commerce is in the hands of a comparatively small number of very wealthy firms, the chief expenditure of whose members is not necessarily in London. The docks and ship-building are sources of revenue immediately connected with commerce, and much more exclusively local. The manufactures of London, fostered partly by commerce, partly by the causes afterwards to be enumerated, are a source of revenue strictly local, and of an extent which cannot easily be estimated. There are large districts, such as the greater part of South London, which from the extent of their public works resemble first-class manufacturing towns; but besides this there are manufactures of a minor kind interspersed over the whole of London, and amounting to a great aggregate, which are chiefly due to the precedence of London as an entrepôt and centre of population. As in every large town there are numerous occupations which a small town will not support, so in the largest of all there is the largest number of such trades. In every art there is a limited demand for the highest class of workmanship, and numerous subordinate branches of manufacture will not support a workman even in every large town; all these operations are naturally concentrated where the demand is greatest, hence a large army of high-paid artisans. As the seat of the court and Parliament London possesses a source of revenue of the highest importance and of extraordinary elasticity. It is this which connects its expansion directly and proportionately with the general prosperity of the country. The immediate expenditure of the court and legislators would be nothing; but their presence attracts the wealthier classes from all parts of the country, who pour the produce of the estates of England and of her provincial commerce into London as the chief centre of expenditure in the kingdom. This raises indirectly another extensive source of revenue. It gives the shopkeepers and warehousemen of London a pre-eminence which enables them to draw to the metropolis the manufacturing products of all parts of the kingdom to be thence distributed as from a central depot. The number of casual visitors and of foreign residents with means elsewhere, who are attracted to London, is another great source of revenue to the London shopkeepers. Finally, art, literature, and science find their chief centre in London, and all who are interested in them flock thither. Printing, publishing, and all the cognate trades are thus drawn thither. It is the final court of appeal not only in law but in commerce, and in every other pursuit of life. All who have succeeded elsewhere tend thither to reap the full reward of their success, and all who have failed elsewhere to have the judgment of fortune reversed. The counteracting forces by which the prosperity of London is limited are to be found in the very conditions of its growth. It owes its pre-eminence to being the capital of a commercial country. Commerce lives by competition, and it has already numerous competitors among the other large cities of the kingdom. The centrifugal force which in all large cities drives population from the centre operates in London with its maximum intensity, but even by yielding to it the enhanced expense of living in so great an aggregate of population is not evaded. The price of ground, the average of wages, and all the elements of expense in commerce and manufactures are high in London. It is thus weighted in the

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race of production, and has in many particular industries lost ground already against many more lightly equipped antagonists. The more London in spite of these disadvantages continues to grow, the greater the disadvantages must become, it need therefore cause no surprise to learn from the registrar-general's returns that the rate of its increase has begun gradually to decline.

History.—In the reign of Nero London was already a place of considerable importance; and after the Romans left Britain it is supposed to have become the capital of the Eastern Saxon Kingdom. Little more is known of it during the Heptarchy than that it suffered severely by fire in 764, 798, and 801. When England was united under one monarch London became the metropolis of the kingdom, and soon afterwards it was sacked by the Danes. At the Conquest London submitted to William, and received from him a charter, which is still preserved; and on the accession of Henry I. a new charter was granted—the model from which Magna Charta was taken—restoring the privileges which existed before the Norman Conquest. London Bridge, erected instead of a wooden one, was begun in 1176 and finished in 1209. This was to a great extent the same that was taken down in 1832. In 1218 the forest of Middlesex was cleared, and that portion of London north of the city began to be built. In 1236 water-pipes began to be laid in the city; and early in the fourteenth century coal was first introduced. In 1328 the village of Southwark was incorporated with the city, as it had previously served as a place of refuge for malefactors. In 1349 and 1361 London was visited by the plague. In 1381 broke out the rebellion of Wat Tyler, who fell by the hands of the lord-mayor, hence the dagger on the city arms. In 1416 lamps were introduced; in the same century some of the principal streets were paved, and wooden houses began to be replaced by others of brick. In the next century improvements were continued, and Westminster was connected with the city by a row of noblemen's mansions along the river, the last of which, Northumberland House, has made way for the Grand Hotel. In the seventeenth century Spitalfields was covered with houses; and the space north of the Strand, as far as Holborn, and from Temple Bar to St. Martin's Lane, was extensively built upon, as well as the neighbourhoods of Charing Cross and Pall Mall. The New River was completed, and many houses were supplied with water; sewers were dug; smooth pavements were laid down for passengers; and hackney-coaches came into general use. But the streets were so narrow and dirty, and the houses in so filthy a state, that the city was scarcely ever exempt from the plague, which sometimes committed great ravages. In 1666 the great fire broke out, and spread over 336 acres, destroying 13,200 houses, ninety churches, and many public buildings. In rebuilding considerable improvements were introduced; and a fire in Southwark ten years after gave a similar opportunity of improving that district. Population and trade now rapidly increased, partly from the immigration of French Protestants driven from their country by the revocation of the Edict of Nantes. In the eighteenth century the metropolis steadily advanced in extent, prosperity, and splendour. In 1780 took place the Gordon riots, when the mob were in possession of London for two days and committed frightful havoc. Since that disgraceful outbreak the peace of London has never been seriously endangered; and the troops stationed in and around the capital, together with the effective police force that now exists, seem quite adequate to insure it against any similar disturbance. The extension and improvements which have taken place in London during the present century are still greater than at any former period, and further changes of great importance are now in operation. The most remarkable event of recent times in the history of the metropolis is the carrying into effect in 1851 of the Great World's Exhibition, originated by Prince Albert, which has led to numerous exhibitions of a similar kind both at home and abroad. (See EXHIBITION, INDUSTRIAL.) In June, 1861, occurred at Tooley Street the largest fire that there had been in London since the Great Fire of 1666. The property destroyed was valued at a million and a half sterling, and the ruins were still smoking seven weeks after the fire commenced. In 1862 took place the second great international exhibition. On Oct. 1, 1864, a great explosion of gunpowder in the Erith Marshes blew into the river about 130 feet of the embankment, and exposed the low-lying districts of south-eastern London to some jeopardy. By great exertions the embankment was restored before any damage was done. Another event that created a considerable sensation, and caused some loss of life and a great destruction of property, was the blowing up of 5 tons of gunpowder on board a boat in the Regent's Canal on the morning of October 2, 1874. The citizens of London have taken a considerable part in the general history of the country, and have always been distinguished for public spirit and independence. The first Stuarts were extremely jealous of the growth of London, and attempted to stop it by proclamations and fines, which with other persecutions alienated the citizens, and predisposed them to side with the Parliament and Cromwell, to whose success they largely contributed.

LONDON, the capital of Middlesex county, Ontario, situated at the junction of the two branches of the Thames, on the Great Western Railway, 121 miles west of Toronto. It was first laid out in 1825, and is well and regularly built, with wide streets and some handsome public buildings, among which are the city-hall, court-houses, hospital, Western University, several colleges, many churches and schools. There are extensive oil-refining works, iron-foundries and machine shops, carriage and wagon factories, chemical works, mills, breweries, tanneries, &c. It is the centre of the finest agricultural region of Canada, and carries on an active trade in wheat and agricultural produce. It is celebrated for its white sulphur springs. Pop. in 1881, 19,746.

LONDON, TREATIES AND CONVENTIONS OF. The following are the most important of the treaties and conventions concluded in London in recent times:—The Quadruple Alliance, formed 2d August, 1718 (see separate article). On 6th July, 1827, a treaty was signed between England, France, and Russia for regulating the affairs of Turkey and Greece, which led to the establishment of the Kingdom of Greece. On 22d April, 1834, a quadruple alliance was formed between England, France, Spain, and Portugal against the claims of Don Carlos and Don Miguel to the crowns of Spain and Portugal. On 15th July, 1840, a treaty was concluded between England, Russia, Austria, and Prussia to compel Mehemet Ali to restore Candia and Syria to the Porte, and on 27th November, at the conclusion of a short campaign by an Anglo-Austrian army in Syria, Mehemet Ali agreed to the terms of the treaty. A convention to close the Dardanelles against ships of war was signed on 13th July, 1841; and a convention between France and England for suppression of the slave-trade 29th May, 1845. Austria, France, England, Prussia, Russia, and Sweden were parties to a treaty signed 8th May, 1852, for settling the succession to the Danish crown, and guaranteeing the integrity of its dominions in relation to the duchies of Schleswig-Holstein. The rights of the German Confederation were reserved and the

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claims of the Duke of Augustenburg on the duchies relinquished on satisfaction. On the 13th March, 1871, at a conference of the great powers, the neutralization of the Black Sea, effected by the treaty of 1856, was abrogated. The neutralization of Luxemburg was guaranteed by the five powers at the Conference of London, 11th May, 1867. This treaty was renounced by Prussia 3d December, 1870.

LONDON, UNIVERSITY OF, was originally established as a joint-stock company in 1825. In 1836 two charters were granted, one to a university retaining the name of London University, and having power to examine and grant degrees, another to a teaching body which took the name of University College and now prepares students for obtaining the degrees conferred by the University. A renewal of the charter was granted on the accession of Queen Victoria, and new charters were subsequently granted (1858, 1863) as well as supplementary charters, the last in March, 1878. The object of the institution is to render academical honours accessible to all classes and denominations without distinction. It is solely devoted to the function of examining, and does not undertake the office of instruction. As a body politic and corporate it consists of a chancellor, vice-chancellor, fellows, and graduates. The fellows are thirty-six in number, appointed by the crown or the senate, which consists of the chancellor, vice-chancellor, and fellows. The chancellor is appointed by the crown; the vice-chancellor is elected annually by the senate from among the fellows. The fellows are chosen by the crown or the senate from lists submitted by the convocation of the university, which consists of the graduates of two or three years' standing of the university. The senate is the governing body, and has charge of the property. The university admits as candidates for examination any person who is above sixteen years of age, and confers degrees in all departments of knowledge except theology, including the degrees of Bachelor, Master, and Doctor, in Arts, Laws, Science, Medicine, and Music. Degrees may now be granted to women. The university sends one member to Parliament. A new building was constructed for the university in Burlington Place, Piccadilly, and was opened by the queen on 11th May, 1870. There are two matriculation examinations in each year, two B.A. examinations, and one M.A. examination. There are also provincial examinations for matriculation and for the degree of B.A. The provincial examinations are carried on simultaneously with the London ones before a sub-examiner sent down by the senate. The answers are taken to London in sealed packets, and reviewed by the London examiners at the same time with the answers of the London candidates.

LONDONDERRY, a maritime county, north coast of Ireland, bounded on the north by Lough Foyle and the Atlantic Ocean; on the east by the county of Antrim and Lough Neagh; on the south by the county of Tyrone; and on the west by Donegal. In form it somewhat resembles a triangle. Area, 52,315 acres, of which 390,374 acres are arable land. The county, though not on the whole picturesque, is very diversified in surface, consisting partly of wild and bleak tracts of mountain and moor, partly of flat alluvial lands. Near the source of the Faughan, on the borders of Tyrone, rises Sawel, the highest mountain in the county, with an elevation of 2236 feet. The principal rivers are the Foyle, the Faughan, the Roe, the Bann, and the Moyola. Geologically the county is divided into two districts by the valley of the Roe. In the western the predominant formation is mica slate. The eastern portion of the county consists of a vast area of basaltic rock, with chalk, lias, limestone, and red sandstone underlying it. Iron is found in many of the strata, and iron-stone was formerly worked in Slieve Gallion, where it occurs in abundance. Coal, copper, and lead have been found in small quantities. The richest and most fertile portions are the low grounds along the Roe, the Faughan, and the Foyle, the shores of Lough Foyle, and other parts of the coast, parts of the western half of the Bann valley, the Moyola valley, and the land round Lough Neagh. Agriculture has undergone considerable improvements of late, but is still, generally speaking, in a low state, though superior to what is found in some other counties. The total acreage under crops in 1883 was 177,682, of which 1418 were under wheat, 73,813 under oats, 31,704 under potatoes, and 36,453 under grasses and clover. The total number of cattle in Londonderry in 1883 was 103,755; of sheep, 36,238; and of pigs, 29,729. The staple manufacture is linen. The county is divided into six baronies and forty-three parishes, and returns two members to Parliament. The city of Londonderry and the borough of Coleraine return one each. A great part of the county of Londonderry belongs to several London livery companies, having been granted to them by James I. in 1609, after Londonderry with five other counties had fallen to the crown through the flight of the Earls of Tyrone and O'Donnell. Pop. in 1871, 173,905; in 1881, 164,991.

LONDONDERRY, a city, seaport, and assize town, the capital of the county of the same name, in the province of Ulster, Ireland. It is situated on the western side of the river Foyle, 23 miles from its mouth, and 124 miles N.N.W. of Dublin. The city stands partly on the northern declivity of an oblong hill inclosed within a bend of the river, partly on the low ground on the north-western side, and to some extent on the adjoining hill; while on the eastern bank of the Foyle a suburb known as the Waterside is united to the city by a magnificent iron bridge, 1200 feet long, and erected at an expense of £80,000. From the river the appearance of the town is picturesque and striking, the houses on the hill rising over each other tier upon tier, while the summit is crowned with the cathedral. The ancient portion of the city is surrounded by a wall 1708 yards in length. It contains a small square, in the centre of which stands the Corporation Hall, and from which four main streets diverge. The walls are pierced by seven gates, giving communication with other parts of the town, the greater part of which now lies outside the walls. The most important of the public buildings are the county court-house, the jail, Gwyn's Institution, the infirmary, the model school, the Academical Institution, Magee College, the free grammar-school, commonly called Foyle College, the lunatic asylum, and the Ebington Barracks. The harbour is commodious, and vessels of large tonnage can discharge at the quay, which extends for 2 miles along the river, and is provided with a graving-dock. An extensive foreign, colonial, and coasting trade is carried on; steamers sail every evening in the week for Greenock and Glasgow, and three or four times a week for Morecambe and Liverpool; while Glasgow transatlantic steamers call three or four times a week at the mouth of the river. The principal export is agricultural produce; the most important imports are timber, grain, iron, coal, flax-seed, flour, and guano. Facilities for internal communication are furnished by the Northern Counties Railway, which connects the city with Coleraine and Belfast; the Irish North-western, which conveys to Enniskillen and Dublin; and the Lough Swilly, which runs to Buncrana. Three large shirt factories give employment to a large number of girls, while a considerable number of smaller establishments are engaged in the same trade. Besides these there are some timber-mills, grain-mills, foundries, coach-factories, and distilleries. The place is well

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provided with the means of instruction. Besides many elementary schools, intermediate education is supplied by Foyle College, founded as a free grammar-school in 1617, and by the Academical Institution, founded by the citizens in 1868, for supplying a good English commercial and classical education. To furnish educational training of the highest order the Magee College, supported by private endowments, was opened in 1865. The secular branches of study are classics, mathematics, logic, metaphysics, natural philosophy, rhetoric, and belles-lettres; the theological course is specially adapted to young men studying for the Presbyterian ministry, and affords them instruction in Hebrew, Syriac, hermeneutics, church history, and theology. The most important library is that of the Magee College, which contains 6000 volumes. The population is about equally divided into Roman Catholics and Protestants. The Roman Catholics have three churches, the Episcopalians five, the Presbyterians six, the Methodists two. Among the Episcopalian and Roman Catholic churches is included in each case a cathedral. The Protestant cathedral is inferior in dimensions and adornment to many parish churches in England. The Roman Catholic cathedral is a massive and magnificent structure, opened in 1873. The Presbyterian churches are in no way striking in their architectural features.

Derry took origin in a monastic establishment, which tradition says was founded on the island of Derry by St. Columba in the sixth century. It remained an ecclesiastical settlement down till 1566, when it was occupied as a military post by the English in their wars with the O'Neils of Ulster. In 1608 the place was burned and the English governor slain by Sir Cahir O'Dogherty, one of the Irish chiefs of Donegal. During the twenty years that followed the corporation of London, who obtained a grant of the place from James I., rebuilt the city, surrounded it with a wall, fortified it with cannon, and gave it a new name. Henceforth it was known as Londonderry. It was the existence of these walls and fortifications which decided the Protestants of Ulster in taking refuge there at the Revolution, and in holding the fortress against the forces of James II. The siege lasted from the 21st of April till the 1st of August, 1689; and the defence by untrained men against superior numbers is regarded as one of the most heroic and successful military actions of modern times. The fullest and most accurate account of the siege is to be found in Derry and Enniskillen, by Professor Witherow. Londonderry sends one member to Parliament. Pop. in 1861, 20,375; in 1871, 25,242; in 1881, 29,162.

LONDONDERRY, Robert Stewart, Marquis of, the second son of the first marquis, was born in the county Down June 18, 1769, and was educated at Armagh, after which he became a commoner of St. John's College, Cambridge. On leaving the university he made the tour of Europe, and on his return was chosen a member of the Irish Parliament. He joined the opposition in the first place, and declared himself an advocate for parliamentary reform, but on obtaining a seat in the British Parliament in 1794 he took his station on the ministerial benches. In 1796 he became Lord Castlereagh, and having returned to the Irish Parliament, next year he was made keeper of the privy seal for that kingdom, and was soon after appointed one of the lords of the treasury. The next year he was nominated chief secretary to the lord-lieutenant, and by his strenuous exertions and abilities in the art of removing opposition the union with Ireland was greatly facilitated. In the united Parliament he sat as member for the county of Down, and in 1802 was made president of the board of control. In 1805 he was appointed secretary of war and the colonies; but on the death of Pitt he retired until the dissolution of the brief administration of 1806 restored him to the same situation in 1807; and he held his office until the ill-fated expedition to Walcheren, and his duel with his colleague, Canning, produced his resignation. In 1812 he succeeded the Marquis of Wellesley as foreign secretary, and the following year proceeded to the Continent as plenipotentiary of the British government to assist the allied powers in promoting a general peace. His services as a member of the Congress of Vienna in 1814, in the general pacification and arrangements which have been usually designated by the phrase the *settlement of Europe*, form a part of history. It is sufficient to notice here that he received the public thanks of Parliament, and was honoured with the order of the Garter. On the death of his father in April, 1821, he succeeded him in the Irish marquisate of Londonderry, but still retained his seat in the British House of Commons, where he acted as leader. After the arduous session of 1822, in which his labour was unremitting, his mind was observed to be much shattered; but unhappily, although his physician was apprised of it, he was suffered to leave London for his seat at North Cray, in Kent, where, in August, 1822, he terminated his life by inflicting a wound in his neck with a penknife, of which he died almost instantly. This statesman has been censured for a severe, rigid, and persecuting domestic government, and for an undue countenance of despotic encroachment and arrangement as regards the social progress of Europe. His remains were interred in Westminster Abbey with great ceremony, but not without an exhibition of popular ill-will.

LONG, Loch, a narrow picturesque arm of the sea, Scotland, stretching with a slight curve, north and north-east from Frith of Clyde for about 16 miles between the counties of Argyle and Dumbarton. An offset to the north-west is named Loch Goil. The village of Arrochar at the head of the loch is only about two miles from Loch Lomond.

LONGAN (*Dimocarpus longan*), a fruit very similar to litchi (which see), a native of the south of China. It has been cultivated in the East Indies, and successfully in hothouses in Europe. The flower of the longan is only distinguished from that of the litchi, to which it bears a considerable resemblance, by having eight petals, while the litchi has none. The fruit of the longan is always brown, and is smaller than that of the litchi, which is generally red. The trees are of moderate size, with brown bark and very bright twigs. The fruit is in bunches, pendent from the extremities of the twigs. The bunches are on stalks from 6 inches to 1 foot in length, the fruit-stalks being 1 or 2 inches long. The leaves are large and graceful, somewhat resembling those of the laurel. The fruit is covered with scaly processes, which are more prominent than in the litchi, and has a tough, thin, leathery coat covering the pulp, inside which is a single brown seed. It is about 1¼ inch in diameter. The pulp is colourless, semi-transparent, slightly sweet, and of a very grateful flavour. The Chinese ascribe medicinal qualities to it, and on this account prefer it to the larger and more handsome fruit of the litchi.

LONGEVITY. The probable or average duration of human life is a question of great importance in many social and economic arrangements; it has consequently been for a considerable time the subject of exact statistical investigation, and although the results yet arrived at are liable to considerable modification from more extended inquiry, a certain degree of accuracy has been arrived at in estimating the probable duration of life under a great variety of

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circumstances. It is found that the average duration of life differs very materially in different countries, and in the history of the same country it has been found to differ materially at different epochs. (See the articles ANNUITY and MORTALITY.) Another question in connection with the duration of life, which has been the subject rather of literary controversy than of statistical inquiry, is not the average, but the possible or highest actual duration of human life. Common observation leads to the conclusion that a comparatively small number of men reach the age of 70; a very much diminished number attain to 80; 90 is so rare that few people can recall more than one or two instances of its having been attained; and although there are well-authenticated instances of persons having reached 100 years, these are necessarily still more rare. In a question of this sort there is great scope for imagination to work. When men hear or read of instances of longevity at distant times or in distant places, they may very readily go beyond well-ascertained fact in generalizing these instances, and in inferring from them a state of society or conditions of human life different from that to which they are accustomed; or they may, assuming that no such differences in the condition of human life exist, bring the particular instances of longevity to the judgment of their own experience, and either hold them as exceptional or unworthy of credit. There are thus two extremes to which, independently of investigation or of the adoption of special theories, men may incline, according to their general habits of thought in judging of such phenomena, and a literary controversy between the holders of these different views becomes inevitable. There are two leading questions into which the case thus stated resolves itself: Have the conditions of human life in regard to its prospects of duration been always such as they are now? and with such conditions as are now inevitable, how far is it possible that the prospect of human life may be extended? In another aspect the question may be considered either retrospectively or prospectively. There are certain alleged facts as to the past duration of human life. How far are these to be held as trustworthy, and how far do they correspond with contemporary observation? and how far are contemporary facts to be held as determining future prospects as to the extreme limit of human life? Unfortunately neither the speculative nor the historical question admits of exact determination. Physiologists are generally agreed that there is a law of limitation to organized life, that a period of growth and development is followed by a period of decay and death. It would seem also that in the higher forms of organization this law is even more rigid and uniform in its application than in the lower, that animal life is if possible more absolutely subject to the law of decay than vegetable. A tree, which, according to some physiologists, is rather a succession of organisms than an individual organism, has been known to live for centuries, and has been held by some authorities, under proper conditions, to be immortal; but there are no such means of perpetual renewal for the more marked individuality of the animal. When the particular life has run its course, decay and death inevitably follow. This uniformity of experience has made the majority of physiologists extremely sceptical as to a possible duration of human life much beyond what has been actually observed within recent times. It is of course admitted that the actual conditions of human life are in many respects subject to improvement. The average duration of life in a civilized community does not amount to half what old men are known to reach every day, yet the average duration of life has already been considerably advanced in this country, and from the experience of other countries it is evident that it may yet be greatly advanced. That by the removal of disadvantageous conditions some progress may be made in advancing the extreme length of life it is only reasonable to expect; but it must be allowed that the best authorities on the physical frame of man look upon its elasticity in this direction as extremely small, and that the speculative conclusion of science is, that while the difference between the actual and the possible conditions of life as to its average duration may be considerable, their approximation as to its extreme limit cannot be very distant. When we turn from this conclusion to the alleged facts of history the question is forced upon us, whether the necessary conditions of human existence have always been such as they are now? We have at the very outset in the historical books of the Old Testament a series of chronologies entirely at variance with present experience, and with the conclusion just referred to as founded on it. There we read that the patriarchs before the deluge lived to ages extending to 800 or 900 years. The theory which this has naturally suggested is that the physical frame of man has deteriorated, or that the conditions of his life have become less favourable. If we accept the statements we find in the Bible as literally true, this seems the natural conclusion; and to explain these statements as meaning otherwise than they seem to mean is exceedingly difficult. In the subsequent periods of Bible history there are instances of longevity which are less opposed to modern experience. Abraham lived 175 years, Isaac 180, Jacob, who told Pharaoh that his days had been few and evil, 147; Joseph 110, Moses 120, Joshua 110. In profane history instances of equally great longevity are mentioned but many of these must be set down as not well authenticated, and will not stand the test of critical investigation. In modern times the list of centenarians is very long, and there are undoubted instances of individuals living a few years over the century. Such instances, however, are rare, and the great majority of those recorded or popularly reported are due to carelessness or credulity. The numbers recorded in the census for England and Wales as having attained the age of 100 or upwards are, for 1861, 201; for 1871, 160; for 1881, 141. The progressive diminution of the number is attributed by the registrar-general to more accurate returns.

Among the curious observations connected with longevity is the inquiry how the duration of life is affected by occupation. This subject, though interesting and instructive, cannot be entered upon in detail here. It is sufficiently established that there are many common occupations highly adverse to human life from the deleterious influences to which they expose it. These injurious influences are often susceptible of considerable abatement by the use of proper arrangements, but the prospect of any general removal of them appears very remote. Two other facts seem tolerably well established, that all excessive physical exertion or exposure is adverse to the duration of life, and that regular brain-labour, if not carried to excess, is eminently favourable to it. The learned professions afford some of the most remarkable instances of longevity, and those most distinguished in this respect appear to be the legal and the clerical.

LONGFELLOW, HENRY WADSWORTH, the well-known American poet, was born at Portland, Maine, February 27, 1807, being the son of Stephen Longfellow, a lawyer of that place. He entered Bowdoin College at fourteen years of age (1821) and graduated in 1825. While at college he distinguished himself in the study of modern languages, and at this time he also wrote some short poems which were published

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in periodicals, one of his pieces being the Hymn of the Moravian Nuns. After leaving college he entered his father's office, but he soon accepted the professorship of modern languages at Bowdoin, being allowed to go to Europe for three years to prepare himself for the post. After studying in France, Spain, Italy, and Germany, he entered upon his professorship in 1829, and soon began to publish the results of his studies in the European languages and literatures, both ancient and modern. His first volume was a short essay on the Moral and Devotional Poetry of Spain (1833), which included translations of the Coplas de Manrique and of several sonnets of Lope de Vega. In 1835 he published a volume of prose sketches of travel under the title of Outre Mer, a Pilgrimage beyond the Sea, and at this time he also contributed articles to the North American Review. In 1835 he was elected to the chair of modern languages and literature in Harvard University as successor to George Ticknor. After spending a year in Europe, travelling and studying more especially in Switzerland, Denmark, and Sweden, and increasing his knowledge of Scandinavian literature, he entered on his professorship in 1836. In 1839 he published Hyperion, a Romance, and Voices of the Night, his first volume of original verse, comprising the selected productions of nearly twenty years. It procured him immediate recognition as a poet. Ballads and other Poems and a small volume of Poems on Slavery appeared in 1842; the Spanish Student, a drama in three acts, in 1843; the Belfry of Bruges in 1846; Evangeline, a Tale of Acadie, in 1847, the latter being in hexameter verse, and perhaps the most important poem in the English language in which this measure is adopted. In 1845 he published a volume—The Poets and Poetry of Europe, giving specimens of their writings; in 1849 Kavanagh, a tale in idyllic prose; in 1850 The Seaside and the Fireside; in 1851 The Golden Legend, perhaps his greatest work; in 1855 Hiawatha; in 1858 the Courtship of Miles Standish; in 1863 Tales of a Wayside Inn; in 1866 Flower de Luce; in 1867–70 an excellent poetical translation of Dante; in 1869 New England Tragedies; in 1871 the Divine Tragedy; in 1872 Three Books of Song; in 1874 The Hanging of the Crane; in 1875 Morituri Salutamus, a poem read at the fiftieth anniversary of his class at Bowdoin College, and the Masque of Pandora; and in 1878 Keramos. He resigned his chair at Harvard in 1854. In 1841–42 he travelled in Europe, and again in 1868–69, on which latter occasion Cambridge conferred on him the degree of LL.D., and Oxford that of D.C.L. In 1874 he was proposed for the rectorship of Edinburgh University and received a large number of votes. He died 24th March, 1882. Some of his poems have been translated into many languages, and complete editions of them have been widely circulated wherever the English language is spoken. In our own country his popularity has been very great, and it has never been felt that he was in any way distinctively an American poet.

LONGFORD, an inland county of Ireland, in the province of Leinster; bounded north by Leitrim and Cavan, east and south by Westmeath, and west by Roscommon, from which it is separated by the Shannon and Lough Ree; area, 269,409 acres, of which 200,704 acres are arable. The surface is for the most part flat, but in the north it rises into bleak hills of no great elevation. A large part of the southern half of the county consists of a low tableland. There are many lakes either in the county or on its borders. A great part of the western boundary is formed by the Shannon, which in the north-west expands into Lough Forbes, 5 miles long by 1 broad; and at Lanesborough into Lough Ree, a fine sheet of water extending to Athlone, a distance of 18 miles, and having in some parts a breadth of 6 or 7 miles. The county is watered by the rivers Inney, Camlin, and Kenagh. Bogs are numerous and extensive, and most of them are capable of being drained and reclaimed. A great portion of the south of the county consists of rich soil suitable for growing all kinds of grain and green crop. One of the poorest portions is the boggy district around Lough Ree, and in the west generally there is much boggy soil. The total acreage under crops of all kinds in 1883 was 71,431, of which 35,429 were under grasses and clover, 18,489 under oats, 12,026 under potatoes, and 133 under wheat. The total number of cattle in 1883 was 56,248; sheep, 26,211; pigs, 21,335. The farms are generally small. Linens and coarse woollens are manufactured; but grazing and dairy farming are the principal pursuits. The county is traversed by the Sligo and Cavan branches of the Midland Great Western Railway. The Royal Canal enters it in the south-east, and passing through it in a north-westerly direction terminates in the Shannon at Richmond Harbour, 1 mile below Tarmonbarry. By this means the county has water communication with Dublin, and by the Shannon with Limerick. It is divided into six baronies and twenty-six parishes; and returns two members to Parliament. Chief towns Longford and Granard. Pop. in 1841, 115,491; in 1871, 64,501; in 1881, 61,009.

LONGFORD, a town, Ireland, capital of county Longford, on the left bank of the Camlin, 70 miles north-west of Dublin, on the Midland Great Western Railway. It is a busy place; contains a county court-house, county prison, union workhouse, barracks, a handsome Protestant Episcopal church, and two or three places of worship for Dissenters, and, in the outskirts, a very fine Roman Catholic chapel of modern erection. There are also a number of extensive stores, corn-mills, tan-yards, &c. A branch from the Royal Canal terminates here. Pop. (1881), 4380.

LONGINUS, Dionysius, or Cassius, a Platonic philosopher and celebrated rhetorician of the middle of the third century, born about A.D. 213. According to some accounts he was born at Emesa, in Syria; according to Ruhnken Athens was his birth-place. Greek literature was the principal subject of his studies. At Alexandria, Athens, &c., he attended the lectures of the most distinguished scholars. He studied the philosophy of the day under Ammonius Saccas at Alexandria, but subsequently became an ardent adherent of the Platonic philosophy, and annually celebrated the birthday of its founder by a banquet. He read the works of Plato with diligence, and wrote commentaries on his dialogues, some fragments of which are extant. They are free from the allegorizing tendencies of the philosophers of his day, but as they contain discussions on style and diction Plotinus denied him the title of a philosopher. After leaving Alexandria Longinus devoted himself to teaching at Athens. His most celebrated pupil was Porphyrius, who deserted him for Plotinus, but with whom he remained on friendly terms. He lectured on philosophy, criticism, rhetoric, and grammar, and composed numerous works. He afterwards visited the East, and on the invitation of Queen Zenobia he went to Palmyra to instruct her in Greek learning and to educate her children. On the death of her husband he was employed by her in the administration of the state, and advised her to throw off the Roman yoke, by which means he was involved in the fate of this queen. For when Zenobia was taken prisoner by the Emperor Aurelian, and could save her life only by betraying her counsellors, Longinus, as the chief of them, was seized and beheaded, A.D. 273. He suffered death with all the firmness of a philosopher.

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As a philosopher Longinus stands apart from his age as a genuine follower of Plato without the mysticism of the neo-Platonic school. He was also distinguished by his oratory as well as his statesmanship and love of liberty. He is said to have been the only Greek who both knew how to teach oratory and to show by his own example what oratory is. He appears to have known Latin and Syriac as well as Greek. All of his works that have been preserved are quotations contained in contemporary and subsequent writers, and the greater portion of his work on the Sublime (Peri Hypsous). There is only one manuscript extant, and the lacunæ in it, which are numerous, cannot be filled up.

LONG ISLAND, an island belonging to the state of New York, extending 120 miles in length and varying from 10 to 20 miles in breadth; area, 1682 square miles. On the west it is divided from Staten Island by the Narrows, and from Manhattan Island by the East River. On the north East River and Long Island Sound separate it from the mainland. Its eastern extremity is Montauk Point. On the south it is washed by the ocean. The coast is deeply indented with bays and inlets. Like other insular positions its climate is more mild than that of the adjacent continent. The island is divided into three counties—King's, Queen's, and Suffolk. The south side of the island is flat land, of a light, sandy soil, bordered on the sea coast with large tracts of salt meadow. The soil, however, is well calculated for raising grain, especially Indian-corn. The north side of the island is hilly, and of a strong soil, adapted to the culture of grain, hay, and fruits; and the eastern part is remarkably adapted to the growth of wood, and possesses large pine forests. Great quantities of vegetables are grown in the island for the use of New York. The population is 599,549. Brooklyn is the chief city. There are many fishing towns and bathing places along the coast. A railway passes through nearly the entire length of the island.

LONG ISLAND CITY, the capital of Queen's County, New York, United States, on the west coast of Long Island, separated from Brooklyn by Newton creek on the south. The city, which was incorporated only so recently as 1870, already contains several railway-stations, extensive warehouses, oil-refineries, granite works, and has manufactures of pianos, cabinet-ware, carpets, chemicals, &c., extensive timber-yards, machine shops, and carriage works. It is the centre depot for the storage and shipment of refined petroleum consigned to New York. Four lines of tramways connect together the various parts of the city and Brooklyn, and ferries ply between it and New York. Pop. 17,129.

LONGITUDE, of a heavenly body, is the angle between two planes, both of which are at right angles to the ecliptic, and pass through the sun (*heliocentric* longitude) or through the earth (*geocentric* longitude); one of these planes passes through the vernal equinox (the first point of Aries) and the other through the heavenly body in question; in fact the ecliptic is regarded as a second celestial equator, with the sun or the earth in its centre, and longitude is the angle between two meridians. The longitude of a place on the earth is the angle between the meridian through the place and some fixed meridian. In England longitude is measured from the meridian of Greenwich, in France the meridian of Paris, in America the meridian of Washington. Longitude, or the angle between two meridians, may be measured by the arc of the equator, or of any parallel intercepted between them. As the parallels get smaller towards the poles, it is evident that degrees of longitude which are 69½ statute miles long at the equator get shorter towards the poles. At all places of the same latitude the length of a longitude degree (measured due east and west) is the same. A degree of longitude in latitude l is equal to 69½ English miles × the cosine of l. (See DEGREE.) As the earth turns through 360° of longitude in twenty-four hours, if the sun or a star is on the meridian at any place it will be on the meridian at another place 15° west of the first in one hour. Thus 15° of longitude represent one hour of difference in apparent time. All methods of determining longitude are based on this fact. (1.) A method formerly employed to determine the difference in longitude between two land stations was to carry chronometers backwards and forwards a number of times from one place to the other until the effects of variation of rate had been eliminated; comparison of their indications with the siderial times at the places gave the longitude. It is now usual to employ the telegraph; the transit of a star at A is recorded on a chronoscope at A, and by telegraph on another at B; the transit of the same star at B is in the same way recorded at A and B; the difference in siderial time between the places is thus recorded on both chronoscopes, and the mean value is the true difference. (2.) A ship carries a chronometer indicating Greenwich time; the local time at any place is known from observation of the sun, hence the longitude of the place may be calculated. (3.) The Nautical Almanac gives the Greenwich time at which the moon is at certain distances from certain stars; mariners note the local time at which the moon is at the same distances from these stars (they are aware of the local time from observation of the sun in the day-time), and so the longitude is known. (4.) The eclipses of Jupiter's satellites are seen by all observers on the earth at the same instant; their Greenwich times being noted in the Nautical Almanac, and their local times being observed as in method (3), the difference in time from Greenwich is known. The tables of these eclipses are not yet complete enough for this method to be in great use. Observations of lunar transits and the occultation of fixed stars afford other means of determining longitude.

LONGTON, a municipal borough and local board district of England, in Staffordshire, pleasantly situated on a small stream, and on the Crewe and Uttoxeter line of the North Staffordshire Railway. It has some spacious and well-built streets, and some good buildings, among which may be mentioned the town-hall, the two parish churches, the Roman Catholic chapel, market-halls, and public baths. Longton is an important seat of the china and earthenware manufacture, and has also breweries, malt-kilns, and brick-works. Many of the inhabitants are employed in the collieries and iron-mines of the vicinity. Pop. in 1881, 18,620.

LONIGO, a town of Italy, in Venetia, in the province of and 13 miles south-west of Vicenza, on the left bank of the Gua. It is protected by three strong towers of great antiquity, as is attested by inscriptions borne by them. It has a court of law, several public offices, and five churches. The inhabitants are for the most part engaged in agricultural and commercial pursuits. Pop. 7902.

LONS-LE-SAULNIER, a town, France, capital of the department of Jura, in a basin nearly surrounded by mountains, 45 miles south-west of Besançon. It consists of a principal street lined with arcades, and several other clean, regular, and well-built streets; and has several fine fountains, a library, and museum. The staple manufacture is salt, obtained in brine from a deep well at the north angle of the town. It is largely exported to the surrounding departments and Swiss cantons; and there is also a considerable transit trade, Lons-le-Saulnier forming the entrepôt between the Jura and Lyons and the interior. The

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composer of the Marseillaise, Rouget de Lisle, was born at Lons-le-Saulnier. Pop. (1881), 12,373.

LOO-CHOO, Lew-Chew, Liu-Kiu (Japanese, Riu-Kiu), a chain of islands in the Pacific, east of China and south of Japan. The name is sometimes applied to the whole chain, stretching from 25° to 30° N. lat. (area 1864 sq. miles); and is sometimes restricted to the group south of 29° N. lat. (area 1423 sq. miles), the northern group, known as the Linschotens, Shichi-to, or Cecille Archipelago, being considered as belonging geographically to Japan proper. The largest island is Okinaw, or Great Loo-Choo (area about 500 sq. miles), the political centre of the whole group; it consists mainly of a succession of rounded swelling hills (never rising over 500 feet in height), interrupted towards the centre of the island by bare and precipitous crags. Oshima, the island next in size (area 300 sq. miles), has a much more mountainous surface, the highest peak attaining the height of 2100 feet. Pine-trees cover the hills of the various islands, the valleys and hillsides are occupied by cornfields, and the climate is healthy, temperate, and favourable for agriculture. The chief products are rice, wheat, maize, and batatas; the sugar-cane, cotton, sago, tobacco, indigo, &c., are also grown. Among fruits are the watermelon, the fig, the peach, the banana, &c. The most abundant trees are the pine and the banyan. The domestic animals include a small but superior breed of black cattle, ponies, goats, pigs, and poultry. The people are excellent agriculturalists and gardeners. The peasantry, who may be said to form the middle class, rent their farms from the government; the condition of the lower classes is unfavourable; they have neither civil rights nor personal freedom, and great part of their earnings serve only to support the luxury of the ruling class, who are as in China an aristocracy of literati. Confucianism is the prevailing religion, but Buddhism has a considerable number of adherents. But little was known to us about these islands until 1816-17, when they were visited by Maxwell and Hall; and our knowledge has now been largely increased by Commodore Perry, chief of the United States expedition of 1853, and by later voyagers. The archipelago till 1874 paid tribute both to China and Japan, but since then it has been entirely corporated in the Japanese empire. Pop. (1880), 310,545.

LOODIANA, a town in India, Panjab, division of Umballa, capital of a district of the same name, 125 miles N.N.W. of Delhi. It is poorly built, and is only defended by a fort of no great strength, though its position on one of the great routes from Delhi to the north-west makes it strategically important. The manufactures are important and consist chiefly of fine shawls, made to imitate those of Cashmere, and, though far inferior to them, commanding a ready sale from their greater cheapness; and of a coarse and very strong cotton cloth, much used for clothing by the poorer classes, and suitable also for tent-cloths. Loodiana has also a very extensive transit trade. Pop. 39,983.—The district of Loodiana, part of the Cis-Satlej territories, between lat. 30° 34′ and 31° 2′ N.; lon. 76° 25′ and 77° E., has an area of 1368 square miles; pop. 583,245.

LOOM. See Weaving.

LOOMING. See Mirage.

LOON. See Diver.

LOOPHOLES, in modern fortifications, are small apertures in the walls, pierced for the use of riflemen. They widen towards the outside, and are splayed or stepped inside, that they may rake as wide a range of approach as possible, and that a bullet may not penetrate unless fired straight into the centre. They correspond for musketry fire to *embrasures* for cannon. In mediæval military architecture loopholes were straight, slit-like openings, which served for the discharge of arrows, javelins, and other missiles from within, on assailants. Battlements of castles and churches are occasionally pierced with cross-shaped loopholes by way of ornamentation.

LOOSHAIS, or Lushais, a wild tribe or collection of tribes inhabiting an extensive tract of hilly country bordering on Assam, densely covered with jungle, and traversed by numerous streams. The Looshais are a semi-nomadic race, who pass their time alternately in rude cultivation, hunting, and internal warfare, varied by occasional predatory incursions on territory occupied either by the British or the semi-independent states protected by them. Their country is situated between 24° 20′ and 22° 30′ N. lat.; and 93° and 94° 30′ E. lon. Roughly stated, the dimensions are 60 miles broad at the widest part, by 135 miles long. The inhabitants are organized under hereditary chiefs. The earliest mention of them is contained in a letter addressed in 1777 by the chief of Chittagong to Warren Hastings, in which they are described as troublesome freebooters. Little was heard of them after that till 1860, when, having committed some murderous raids on British subjects in Tipperah, a superintendent of hill tribes was appointed, and next year a small force under Major Raban entered the hills, and punished the tribes chiefly concerned. In 1869 the Looshais made a daring inroad into the territory of the protected chief of Manipur, and the Indian government having resolved to chastise them, preparations were made under the advice of Lord Napier of Magdala, and hostilities were commenced by General Bourchier 1st December, 1871. After inflicting on the Looshais a punishment sufficiently severe to inspire them with terror of the British arms, and to deter them from molesting or injuring any of their neighbours under British protection, the troops commenced to return 5th March, 1872.

LOPE DE VEGA. See Vega.

LOPHOBRANCHII (Greek, *lophos*, a tuft; *bragchia*, gills). The suborder of Teleostean fishes, including the peculiar 'Sea-horses' (Hippocampidæ) and the 'Pipe-fishes' (Syngnathidæ). The characteristic feature of these forms is the conformation of the gills, which are arranged in pairs of little tuft-like masses along the branchial arches, instead of in the comb-like manner of other bony fishes. The opercula or gill-covers are large, but are attached by membranes, in which only a small aperture is left for the escape of the water used in respiration. The skeleton appears to be in some respects imperfectly ossified. The bones of the head are much prolonged anteriorly, so as to form a snout-like projection, at the extremity of which the mouth is placed. The scales are of the ganoid description, and consist of hard bony plates, of considerable size when compared with the size of the body, and which render the form of these fishes somewhat angular. The fins are rudimentary, the pectoral fins being generally present, whilst the ventrals are usually wanting. The dorsal fins are small, and the anal and caudal fins may be unrepresented; but if developed, do not attain any great perfection. The air-bladder is present in the Lophobranchii, but does not open externally by a pneumatic or air duct. The members of this group present several very interesting and curious points in the consideration of their habits, especially with reference to the care of the young. See Pipe-fishes and Sea-horses.

LOQUAT (*Eriobotrya Japonica*), a Japan fruit, of the natural order Rosaceæ, and sub-order Pomeæ. The leaves are lanceolate and serrated, the fruit about the size of a large gooseberry, of a fine yellow colour,

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and, according to Sir Joseph Banks, as good as the mango. The tree is a beautiful evergreen, whose white flowers, in terminal woolly panicles, have a fragrance like that of hawthorn blossom. It attains a height of from 20 to 30 feet, but when cultivated it is not allowed to exceed 12 feet. It thrives well in Australia, where it was introduced for the sake of its fruit, which is now sold at a cheap rate in the markets of the larger towns. It requires a warm climate to mature fruit of fine quality, but it can live and produce fruit, though of inferior quality, in the open air in the south of England. It is often reared in hothouses in this country, and the fruit is ready for use in March. It may be grafted on any species of the genus, or on the hawthorn.

LORCA, a town of Spain, in the province and 42 miles south-west of Murcia, on a slope crowned by a castle, with regular works in good repair. It consists of two parts—an ancient, with narrow winding streets and mean houses; and a modern, which though somewhat irregular, is of a superior description. The principal edifices are eight parish churches, one of them with a magnificent portal; an episcopal palace, a court-house, three nunneries, and an hospital. The manufactures consist chiefly of coarse woollens, linen, leather, soap, and earthenware; and there is an important annual fair, which lasts fourteen days. In the vicinity are lead mines. Lorca figures much in the wars of the Moors. Among its natives are the painters Juan di Toledo, Pedro Camacho, and Baltasar Martinez. Pop. 52,934.

LORD (Anglo-Saxon *hlâford*, for *hlâfweard*, that is, bread-keeper), a title of honour or dignity, used in different senses. In the feudal times lord (*seigneur*) was the grantor or proprietor of the land, who retained the dominion or ultimate property of the feud or fee, the use only being granted to the tenant. A person who has the fee of a manor, and consequently the homage of his tenants, is called the *lord of the manor*. In these cases the lordship or barony was connected with the seigneurial rights of jurisdiction. The superior lord is styled *lord paramount*, and if his tenants again grant a portion of land to other persons, they being tenants in reference to the lord paramount, and lords in reference to their own tenants, are called *mesne* or *mean*, that is, *middle lords*. *Lord* is also a mere title of dignity, attached to certain official stations, which are sometimes hereditary, but sometimes only official or personal. All who are noble by birth or creation, as the peers of Britain, are called *lords*. The five orders of nobility constitute the lords temporal, in contradistinction to the prelates of the church, or lords spiritual, that is, such archbishops or bishops as are members of the legislature, both of whom sit together in the House of Lords. (See PEER.) It is sometimes only an official title, as *lord advocate*, *lord mayor*, &c. It is also applied, but only by courtesy, to the sons of dukes and marquises, and to the eldest sons of earls. In Scotland the judges of the Court of Session and Justiciary prefix the title 'lord' to their surname, or to some territorial designation assumed by themselves. Judges, when on the bench, are addressed as 'My lord' throughout the three kingdoms.

LORDS, HOUSE OF. See PARLIAMENT; also BRITAIN.

LORD'S PRAYER. See PATERNOSTER.

LORD'S SUPPER, one of the sacraments of the Christian religion, in the observance of which Christians commemorate the death of the Founder of their religion. It is so called because the Lord Jesus Christ instituted the rite when he took his last meal with his disciples. It has also the names of eucharist and communion, and is celebrated by all sects of Christians except the Quakers, however much their views may differ as to its nature and virtue. The bread, which the Lord broke after the oriental manner, was a fitting symbol of his body, which was soon to be broken; and the wine was a significant symbol of his blood. In all the churches founded by the apostles this usage was introduced. In the first and second century this rite was celebrated in connection with the *agape* or *love-feast*. (See AGAPE.) After the third century, when the congregations became more numerous, the *agapæ* ceased, and the Lord's supper was from thence celebrated on the occasion of every divine service in the churches, in such a way that all present could partake, with the exception of catechumens (that is, Christians not yet baptized) and of unbelievers. These were obliged to withdraw when the celebration of the Lord's supper commenced, because communion was considered as a mysterious act, which was to be withheld from profane eyes. On every important occasion of life it was celebrated, and the deacons carried the bread of life to those whom sickness or imprisonment had prevented from being present at the meeting of the congregation. From the first it was thought to possess a peculiar efficacy, and gradually ideas of the awful and mystical were associated with it. Hence Christians soon began to ascribe supernatural power to the rite, and to take the consecrated bread and wine for more than bread and wine, and to maintain that the body and blood of our Saviour were united with them. Ignatius, Justin Martyr, and Irenæus held this opinion, though it is strenuously combated by Origen; but after the fourth century the supernatural view rapidly gained strength, and the priests alone were empowered to dispense the bread and wine. Hence originated the notion of a sacrifice in the Lord's supper, which was celebrated with ever-increasing splendour, till in the pontificate of Gregory the Great (590) it took the form of the mass. From this originated the doctrine of Transubstantiation, which was started by Paschasius Radbertus, in the ninth century. Though this doctrine was at first opposed (see BERENGARIUS), yet it was soon generally received, and was officially approved by the Council of Rome in 1079. In 1215 it was solemnly confirmed by Pope Innocent III., in the fourth Lateran Council, and has ever since been held by the Roman Catholic Church as an article of faith. From the new doctrine sprang the adoration of the host (in which God was present, according to the new belief), as well as the custom of refusing the cup in the communion to the laity and non-officiating priests, a practice first authoritatively sanctioned at the Council of Constance, 1415, because it was supposed that where the body of Christ was his blood must be too (*Concomitance*), whence the use of the wine was not necessary for the reception of the communion. This refusal was also partly owing to a desire of avoiding every occasion whereby the blood of Christ might be incautiously spilled, and become profaned, and partly to the efforts of the clergy to establish a distinction in their own favour. After the twelfth century the communion of children was gradually discontinued, a practice still admitted by the Greek Church. Even before the origin of the doctrine of Transubstantiation, the Lord's supper, as we have already seen, had begun to be represented as a sacrifice. From this sprang the private mass. (See MASS.) After the notion of purgatory had become prevalent, this doctrine was connected with the above-mentioned conception of the communion as a sacrifice, and now masses were said chiefly for the purpose of delivering the souls of the deceased from purgatory. As early as the seventh century private masses were celebrated in various places; after the ninth century they were in use everywhere. Thus

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the Lord's supper had become, in the course of time, something quite different from the design of its founder. This had been contended previous to the Reformation by some parties dissatisfied with the ruling church, especially by the Hussites (see Hussites, in article Huss) in the fifteenth century, to whom indeed the Council of Basel was obliged to allow the use of the cup in the communion. The reformers renewed the complaint that the church had deviated in the celebration of the Lord's supper from the purpose of Christ and the example of the apostolic age, and both the German and Swiss reformers agreed in rejecting the doctrine of Transubstantiation and the mass, and maintaining that the Lord's supper ought to be celebrated before the whole congregation, and with the administration of both bread and wine. In explaining the words by which the supper was instituted, Luther and Zuinglius differed, and their different opinions on this subject formed the principal subject of the unhappy dissension between the Lutheran and Calvinistic churches. Luther took the words, 'This is my body,' &c., in their literal sense, and thought that the body and blood of Jesus Christ were united, in a mysterious way, with the bread and wine, which, however, remain unchanged, so that the communicant receives, in, with, and under the bread and wine, the real body and blood of the Redeemer. Zuinglius, on the other side, understood the words in a figurative sense, and supposed that Jesus Christ meant to say, 'The bread and the wine represent my body and my blood,' and maintained, therefore, that the bread and wine were mere signs of the body and the blood of Christ, and that the Lord's supper was a mere commemoration of the death of Christ, and a profession of belonging to his church. This view is in substance adopted by the Socinians, Arminians, and German Catholics. From this difference of opinion arose a violent dispute between Luther and Zuinglius, which in later times has been continued between the Lutheran and Calvinistic divines. The opinion advanced by Calvin, by which a spiritual presence of the body and blood of Christ is supposed in the communion, by partaking of which the faithful receiver is brought into union with Christ, through the medium of the Holy Ghost, though it came nearer to the Lutheran doctrine than that of Zuinglius did, yet was essentially different, and therefore also met with a strong opposition from the strict adherents of Luther. Melanchthon inclined to the Calvinistic notion, and so did many other Lutheran divines, who were called by the opposite party *Philippists* and *Crypto-Calvinists*. The *formula concordiæ*, or articles of religious peace, suppressed the Crypto-Calvinists in the greatest part of the Lutheran Church, and established the idea of Luther, consequently there was a final separation of the Lutheran and Reformed or Calvinistic churches, but in recent times many Lutheran divines have inclined to the Calvinistic doctrine. The Greek Church has not adopted the doctrine of Transubstantiation in its whole extent; yet her doctrine, which was defined and sanctioned by the Synod of Jerusalem in 1672, comes nearer to this dogma than to that of the Reformed church. The Oriental Christians differ also from the Western, in using leavened bread in the Lord's supper, and in administering it to children. (See Greek Church.) It thus appears that the differences tween the contending churches hinge on the *mode* in which the body and blood of Christ are present in the elements of bread and wine, for that they are in some way present is admitted by them all. The Reformed churches hold that *presence* means presence in efficacy, and not local nearness, and will admit that it is 'real' in the sense of being efficacious, though not in the sense of being corporeal. However, when they are called on to define efficacy they differ in this, that some mean by it a sacrificial, and others a mysterious supernatural efficacy, emanating from Christ's glorified body. The confessions of the Reformed churches were framed expressly to conciliate the Lutherans, and contain, in consequence, more of the mystical element than is consistent with the sentiments of the framers, as expressed in their writings. The Anglican Confessions, on the other hand, incline more to the view of Zuinglius. The 28th Article of the Church of England, while repudiating Transubstantiation as 'repugnant to the plain words of Scripture,' declares 'that to such as rightly, worthily, and with faith receive the same, the bread which we break is a partaking of the body of Christ, and likewise the cup of blessing is a partaking of the blood of Christ.' It further declares that 'the body of Christ is given, taken, and eaten in the supper only after an heavenly and spiritual manner. And the mean whereby the body of Christ is received and eaten in the supper is faith.' It also condemns the reservation, carrying about, lifting up, and worshipping of the host. Though a certain small, but zealous and influential, section of the Church of England tenaciously holds to the doctrine of a mystical presence, the tendency to regard the rite as mainly commemorative is fast gaining ground. The Westminster Confession, chap. xxix. s. 6 and 7, thus formulates the doctrine adopted by the Presbyterian Church of Scotland, which in the main agrees with that propounded by Calvin: 'That doctrine which maintains a change of the substance of bread and wine into the substance of Christ's body and blood (commonly called Transubstantiation) by consecration of a priest, or by any other way, is repugnant not to Scripture alone, but even to common sense and reason, overthroweth the nature of the sacrament, and hath been and is the cause of manifold superstitions, yea, of gross idolatries. 'Worthy receivers, outwardly partaking of the visible elements in this sacrament, *do then also inwardly by faith, really and indeed, yet not carnally and corporally, but spiritually*, receive and feed upon Christ crucified, and all benefits of his death: the body and blood of Christ being then not corporally or carnally in, with, or under the bread and wine; yet as really, but spiritually, present to the faith of believers in that ordinance, as the elements themselves are to their outward senses.' We have seen that the elevation, adoration, and carrying about of the host, practised in the Greek and Roman Catholic Churches, are expressly condemned in the 28th Article of the Anglican Church. Other minor differences existing in rival churches, and deriving a factitious importance from being symbolically explained, have given rise to bitter and unseemly disputes. While the Roman Catholic Church makes its communicants receive the consecrated wafer with the mouth, the Reformed churches put the *broken* bread into the hand, as symbolical of the broken body of Christ, and the outpoured wine as the symbol of his shed blood.

LORETTO, or Loreto, a city of the province of Macerata, in the Kingdom of Italy, about 3 miles from the sea, the see of a bishop, who is also bishop of Recanati, with 4721 inhabitants, who are principally supported by the resort of pilgrims. Pilgrimages are made to the *Casa Santa*—the Holy House in the Cathedral of Loretto, which is supposed to have been the house of the Virgin Mary in Nazareth, the scene of the annunciation, of the nativity, and the residence of our Lord with his mother and Joseph; and which was carried by the angels (1291) from Galilee to Fiume in Dalmatia, and thence, December 10, 1294, to Italy, near Recanati, and, finally, (1295), to the spot where it now remains. The name

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is derived from Laureta, the lady to whom the site then belonged. This Holy House, which is in the centre of the church, is covered externally with white marble, sculptured in bas-relief by Sansovino, Bandinelli, and Giovanni Bolognese, after the designs of Bramante, and is built of ebony and brick, with one door and one window. It is 30 feet long, 15 wide, and 18 feet high, and richly ornamented; the sculptures represent scenes in the history of the Virgin Mary, with the exception of three on the eastern side, relating to the legend of the translation of the Holy House. It has also been imitated at other places (for instance, at Prague). Loretto formerly contained great treasures, collected from the pilgrims, and the frescoes of the Treasury Chapel are among the finest in Italy. The income of this house once amounted to 30,000 crowns, besides the presents received annually. The pilgrims were estimated at 100,000 yearly. Amongst other curiosities, a window is shown in the Holy House, through which the angel Gabriel appeared to Mary when he announced the birth of the Saviour. Raphael's painting of the Virgin throwing a veil over the Infant is exquisitely beautiful. There are many rich mosaics, frescoes, and castings in bronze; and a bronze statue of the Virgin crowns the great central door of the church. The treasures were in part expended in paying the contributions imposed by the French (1798); the rest was taken possession of by them. They carried the image of the Virgin to Paris, but it was restored with great pomp, December 9, 1802. Julius II., Sixtus V., and Innocent XII. attached indulgences to pilgrimages to the sanctuary, and to prayers offered at the shrine. The number of pilgrims continues to be great, but is far less than it used to be in earlier and darker ages. The three days' lodging and entertainment, which each pilgrim is entitled to receive, seem to be not the least of the inducements to undertake the pilgrimage.

LORIENT, or L'ORIENT, a fortified seaport town of France, in the department of Morbihan, at the mouth of the Scorf, in the Bay of Biscay, 40 miles west of Vannes. Its streets are regular, wide, well-paved, and lined by houses of good construction. The harbour is capacious, safe, and commodious, surrounded by magnificent buildings, among which is a tower, used as a lighthouse and observatory; and lined by handsome quays, where the largest vessels can lie alongside. In the roads whole fleets can ride in safety. At some distance below the harbour its entrance is commanded by a fort built on the Isle St. Michel. Lorient is a station of the French fleet, and has extensive docks and building yards for the construction and fitting out of war vessels; also a marine arsenal, an artillery-park, large artillery barracks, &c. There are an observatory, schools of marine artillery and hydrography, a lyceum, court of the first instance, commercial court, naval court, a theatre, and various societies. The working classes are chiefly employed in connection with the dock-yard and shipping; there is a considerable fishery, and an active trade. The exports are chiefly flour, wine, brandy, liqueurs, &c. Between 4 and 5 miles south of Lorient, at the entrance to the roadstead, lies the fortified seaport of Port Louis (3456 inhabitants), with an extensive sardine fishery, baths, rope-walks, and a considerable coasting trade. Pop. 37,812.

LORIMER, or LORINER (Latin *lorum*, a thong or rein), was a name formerly given to a saddler's ironmonger, or maker of bits, spurs, stirrup-irons, bridles, the iron-work of saddles, and generally of all articles of iron used as mountings for horse-furniture. The 'ancient fraternity' of the Lorimers of London were only incorporated as a distinct guild or company by letters patent as late as 1712, having previously formed part of another guild. In the Scottish burghs the lorimers are combined with the cutlers, locksmiths, and brass-founders to form the Corporation of Hammermen. The craft possesses exclusive privileges, and in 1830 the Court of Session deemed it a violation of those privileges for persons outside of the craft to manufacture metallic articles of horse-furniture, with the intention of having them silver-plated before selling. The word, which is now obsolete, was applied generally to saddlers.

LORIS. See LEMUR.

LORRAINE (German, *Lothringen;* anc. *Lotharingia*), formerly a province of France, afterwards included in the departments of the Vosges, Meurthe, Moselle, and Meuse. Under the Romans it formed part of the Belgic division of Gaul; it was raised to a kingdom by the Emperor Lothaire I. in 855, and was afterwards united to the Empire of Charlemagne. It was subsequently erected into a duchy, and afterwards possessed by dukes of the house of Austria; and, with the Duchy of Bar, was annexed to its crown. In 1736 these two duchies were ceded, in life-rent, to Stanislas Leczinski, ex-king of Poland, father-in-law of Louis XV., and on his death they passed to the crown of France. The inhabitants, though of German origin, speak the French language, except those of the district between Metz and Vosges, which was on that account called *German Lorraine*. At the end of the war between France and Germany in 1870–71, a considerable portion of Lorraine, including the fortresses of Metz and Thionville, was annexed to Germany, and now forms part of the imperial territory of Alsace-Lorraine. German Lorraine has an area of 2402 square miles, and a population of 492,713 in 1880.

LORRAINE, CLAUDE. See CLAUDE LORRAINE.

LORY (*Lorinæ*). The Lorys under this term form a sub-family of the large Parrot family (Psittacidæ). They are distinguished by the elongated slender-shaped bill, which may be notched near the tip. The tail is short, and may be either pointed or rounded, and the wings are of small size. Otherwise they possess most of the characteristics of the parrot tribe. They are all of smaller size than the generality of the parrots, but exhibit even a greater brilliancy of colour than the latter birds. Their centre of distribution is in the Eastern Archipelago; and they are also found in New Guinea, Borneo, and the South Sea Islands. Their food appears to be chiefly flower-juices, soft fruits, and berries. The tongue may be furnished with bristle-like organs, said to be of use to these birds in extracting the flower-juices. The name 'lory' has been given to those birds from their repeating that word when in a wild state. In the East these birds are highly valued. The Scarlet Lory is the most famous and familiar of these birds. It was long unknown in Europe after its discovery by the Dutch; specimens which were brought to this and other countries dying on the voyage home. The scarlet lorys are docile and affectionate in habits; and are special favourites of the Javanese. The Yellow-coloured Lory, deep-red in colour, with a bright yellow circle round its neck, is the most highly valued of the lorys. It is readily domesticated, speaks well, and fetches a high price in this country. A single specimen has brought twenty guineas in London. It is an inhabitant of New Guinea. The Purple-capped Lory (*Lorius domicella*) is also a familiar species.

LOST PROPERTY, strays and waifs excepted, may be retained by the finder with impunity, after proper means have been taken to advertise it; and if it cannot be conveniently preserved without hazard he may dispose of it if not claimed. If, however, the loser can identify his property he has a right to

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restitution, and a third party purchasing lost property from the finder must restore it to the owner, if called upon, and proceed against the seller under the warrandice. The owner of lost movables must not only prove that they once belonged to him, but that he lost possession either by the fraud of some other party, or in such a way that the ownership still remained with him. Lost title-deeds can be recovered under an action of proving the tenor. There are certain cases in which a jury will construe the retention of lost property into larceny. If the finder knows the owner, or can readily discover him, the taking with the intent to keep will amount to larceny; but if there is no reasonable probability that the true owner shall be discovered, then a charge of larceny will not hold. If the finder at the time of finding did not know the owner, and had no means of discovering him, he will not be guilty, though he retains the article, on afterwards ascertaining who the owner is. Nor does it amount to larceny that the finder should keep the lost article, though the owner be known, in the expectation of receiving a reward for giving it up. The finder is not obliged to incur expense in advertising for the owner, and in England, whatever might be the case in Scotland, and it has not been determined, the loser would be under no legal obligation to reimburse him. The loser is not dispossessed of his property by the loss, and when the finder is discovered he can demand it of him. Should the finder of a lost bill transfer it to a third party for value the transferee has a full right to it, but it is competent for the loser to recover the document or its value from the finder. The holder of a lost or stolen bill must prove that he gave value for it, which may be done by parole evidence. Against a person finding a bill the real owner may maintain an action of *trover*. In cases of treasure-trove, that is, the finding of gold, silver, &c., deposited in the earth, the finder must, under a penalty, give notice to the crown, in which the ownership of all treasure-trove is vested.

LOT, according to the Hebrew history, the son of Haran, and the nephew of Abraham, who, to avoid dissensions between his followers and those of Abraham, went east into the plain of Jordan, towards Sodom, while his uncle dwelt in Canaan. Having been taken captive by some marauding chiefs, styled kings in Gen. xiv., Lot was delivered by Abraham from their hands. Having received two angels into his house in Sodom, an attack was made upon it by night by the inhabitants, who were struck blind, and the impending destruction of the city was announced to Lot. He escaped from the devoted spot with his family; but his wife, looking back at the scene of devastation, 'became a pillar of salt.' This is all the biblical narrative says, and does not necessarily imply a special miracle in respect of her, nothing more than that the storm of fire and brimstone, which was destroying Sodom, reached her also, and left her lifeless body incrusted, it may be, with that fearful shower. Later Jewish writers, however, and some of the Christian fathers, speak of having seen this pillar, and relate some marvellous, and even monstrous things about it. Josephus, for instance, says that it was remaining in his day, and that he had seen it. Clemens Romanus and Irenæus assert the same thing, as does Benjamin of Tudela, whose account is suspiciously circumstantial. In Anderson's Official Narrative an account is given of a detached pillar on the Jebel Usdûm, about 40 feet high, which the sailors of the expedition recognized as 'Lot's wife,' and those who look for the 'pillar of salt' in such natural objects will no doubt easily find it. The last thing that is recorded of Lot is his retiring from Zoar to a cave in the mountains with his two daughters, by whom he became the father of Moab and Ben-Ammi, the ancestors respectively of the Moabites and Ammonites.

LOT (anc. *Loda* or *Olitis*), a river, France, one of the largest tributaries of the Garonne, rises in Mount Lozère, one of the Cevennes, near Mende, department of Lozère. It flows west by south across the departments of Lozère, Aveyron, and Lot, and joins the right bank of the Garonne at Aiguillon, in the department of Lot-et-Garonne; having passed Entraigues, where it receives on the right the Truyère, one of its chief affluents, and Cahors, above which it receives, also on the right, its other chief affluent, the Cellé. Total course, about 250 miles, of which 180 miles, commencing at Entraigues, are navigable.

LOT, a department, France, comprising the arrondissements of Cahors, Figeac, and Gourdon, subdivided into twenty-nine cantons and 323 communes, bounded north by Corrèze, east by Cantal and Aveyron, south by Tarn-et-Garonne, and west by Lot-et-Garonne and Dordogne; is 66 miles long by 60 miles broad, and has an area of 2020 square miles. The surface consists chiefly of a limestone plateau, traversed in all directions by ridges of hills, and scooped out into deep valleys. In the east a prolongation of the Mountains of Cantal forms the watershed between the Dordogne and the Lot. The arable land, amounting to a half of the whole, has deep alluvial soils, adapted to wheat, maize, hemp, and tobacco; and lighter soils, more suitable for barley, rye, and root crops. The river slopes are generally planted with vines, and the white mulberry, for silkworms, is extensively cultivated. The principal fruit is prunes, large quantities of which are annually dried and exported. There are numerous flax-mills. Pop. (1881), 280,269.

LOT-ET-GARONNE, a department, France, comprising the arrondissements of Agen, Marmaude, Nérac, and Villeneuve, subdivided into thirty-five cantons and 326 communes; is bounded north by Dordogne, east by Lot and Tarn-et-Garonne, south by Gers, and west by Landes. It is nearly of a rhomboidal form, with an equal length and breadth of about 50 miles, and an area of 2050 square miles. The surface may be regarded as an undulating and somewhat elevated plain, furrowed throughout its length and breadth by well-watered valleys, and belonging wholly to the basin of the Garonne, which traverses it in a north-west direction. More than a half of the department is arable, producing crops of wheat, maize, rye, &c., considerably beyond the consumption. Other important crops are tobacco and hemp. Prunes and chestnuts are largely exported, and the cork-oak is so abundant as to supply the greater part of France. The vineyards, which generally clothe the banks of streams, furnish several wines of the first class. Pop. (1881), 312,081.

LOTHIAN, EAST. See HADDINGTONSHIRE.

LOTHIAN, MID. See EDINBURGHSHIRE.

LOTHIAN, WEST. See LINLITHGOWSHIRE.

LOTIONS, liquid remedies, consisting principally of water, as a menstruum, and applied to circumscribed portions of the skin, or of the mucous surfaces. Lotions are either cooling, stimulating, astringent, soothing, or sedative. Water combined with spirit or vinegar is an example of the first. The spirit is added to the water in the proportion of half an ounce and upward to the half-pint. The lead lotion is at once cooling and astringent. A good stimulating lotion is procured from a mixture of water with a third or a half of its bulk of spirit of wine, which is applied to the skin by means of lint, and covered to prevent evaporation. Astringent lotions are formed by adding from 1 to 10 grains of sulphate of zinc or of white vitriol to an ounce of very cold water, having other astringents in solution. Soothing lotions con-

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sist of the various preparations of opium, of the decoction of poppies, hemlock, &c., and prussic acid is employed in the preparation of sedative lotions. Stimulating lotions are applied to indolent ulcers and tumours, and sedative and narcotic mixtures are employed to alleviate pain.

LOTTERY (from *lot*), a scheme for the distribution of prizes by chance. Lotteries, like every other species of gambling, have a pernicious influence upon the character of those concerned in them. As this kind of gambling can be carried on secretly, and the temptations are thrown in the way of both sexes, all ages, and all descriptions of persons, it spreads widely in a community, and thus silently infects the sober, economical, and industrious habits of a people.

Lotteries are of different kinds:—I. Numerical lottery or lotto (*lotto di Genova*), invented by the Genoese. At the elections of the counsellors the names of the candidates were cast into a vase, and then into a wheel-of-fortune, when wagers were laid upon the event of the elections. The state finally undertook the superintendence of the bank. Benedetto Gentile, a counsellor, first introduced this lotto in 1620. It was everywhere patronized by the multitude, with an interest increasing almost to madness. Wise governments soon saw into its destructive tendency, and put an end to it, or prohibited adventuring in it under a severe penalty.

II. The proper lottery, called also *class lottery* when divided into classes. Its origin is more ancient than that of the lotto, and it probably originated from the transfer of merchandise by lot, of which method the Italian merchants made use even in the middle ages, and of which we also find traces in Germany. So also in France, under Francis I., similar lotteries for merchandise were permitted to the merchants, under the inspection of government, in consideration of certain duties. A money lottery was established at Florence in 1530. In 1571 there appears to have been a public officer in Venice for the inspection of the lottery. From Italy lotteries passed into France, under the name of *blanque* (from the Italian *bianca*, because most of the tickets were blanks, mere white paper, *carta bianca*). In 1582 and 1588 Louis de Gonzaga established such a *blanque* in Paris, for providing poor girls of his estates with dowries; and in 1656 Lawrence Tonti (from whom the Tontines derive their name) sought to establish a large *blanque royale*, which was first accomplished in 1660. Since this time there have been in France only *loteries royales*, but these were finally abolished in 1836. In England the first lottery occurs in 1569, a printed plan of which, as distributed, belongs to the Antiquarian Society in London. In 1612 a lottery was granted in behalf of the Virginia Company. In 1709 the rage for private, and, in many instances, most fraudulent lotteries, was at its height in England, and towards the close of the year an existing act of Parliament was put in force for their suppression as public nuisances, and another to the same purpose was passed in the ninth of Queen Anne. The first parliamentary lottery was instituted in 1709, and from that time till 1824 no session passed without a lottery bill. Lotteries are now abolished in Britain; but in the case of art-unions, from their supposed good effects in encouraging art, the legislature has legalized the distribution by lottery of works of art. Latterly, lotteries for merchandise of all kinds, under the inspection of government, have been frequent in Germany. The managers of the principal lotteries sell only whole tickets. Brokers, however, divide them into halves, quarters, eighths, and even sixteenths, in order to facilitate their sale. In recent times in the Austrian monarchy, in the Kingdom of Bavaria, and in the Duchy of Mecklenburg estate lotteries have been got up, and manufactories, the estates of noblemen, and even whole lordships have been disposed of by lottery, under public sanction, and ordinarily under the security of important mercantile houses, which undertook the disposal of the property, in order to settle the debts of the owners.

Latterly, lotteries have been combined with state loans. When the credit of the state is low, or when the rate of interest is high, efforts have been made to induce capitalists to put their money into the hands of the state by means of a lottery, which gives them the expectation of a premium above the customary interest of the country. For example, If a government is uncertain of obtaining, or cannot obtain, money at 7 per cent., it may perhaps effect its object by offering 4 per cent. for a loan, and dividing the remaining 3 per cent. among the lenders by means of a lottery. In this way loans have been raised in Austria, Denmark, Baden, and other states, and also in Prussia in 1821.

In most, if not all, of the United States of America, lotteries, not specially authorized by the legislatures of the states, are prohibited, and the persons concerned in establishing them are subjected to a heavy penalty. In some of the states lotteries have been very numerous. The object for which they have been granted has been generally the assistance of literary or benevolent institutions—colleges, academies, hospitals, asylums, or of public works—as roads, bridges, the improvement of the navigation of rivers, &c. Their pernicious effects have induced the legislatures of some of the United States to decline granting them in any case.

LOTUS, a name that has been applied very vaguely to various species of plants which have been celebrated in mythology and fabulous tradition. The Greeks applied it (*lōtos*) to at least five different plants, among which the Egyptian lotus, or lily of the Nile, and the lotus of North Africa, the fruit of which formed the food of Homer's Lotophagi, are the most celebrated. In the ancient Hindu and Egyptian mythological representations of nature, the lotus (*Nelumbium speciosum*, Linn.), a kind of water-lily, was the emblem of the great generative and conceptive powers of the world. Several varieties are found in India. When Vishnu, says the Hindu fable, was about to create the world, the god, swimming in the ocean of milk, produced the lotus from his navel. It unfolded its flower, and displayed Brahma, the first result of the creative energy. As an aquatic plant, the lotus was the attribute of Ganga, the goddess of the Ganges. In Egypt it was consecrated to Isis and Osiris, and was an emblem of the creation of the world from water. It was also the symbol of the rise of the Nile and the return of the sun. It is found in bass-reliefs and paintings on the Egyptian temples, in all representations of sacrifices, religious ceremonies, &c., and in tombs, and whatever is connected with death or another life. With both of these nations it was regarded with religious veneration, and the precept of Pythagoras to abstain from beans has been supposed to refer to the fruit of the lotus-plant. The *Zizyphus Lotus*, still prized at Tunis and Tripoli, under the name of the jujube (see JUJUBE), and a favourite subject of Arab poetry, is probably the plant whose fruit was eaten by the Lotophagi, or the *Rhamnus lotus*, another North African shrub, which bears a delicious berry, may be the real lotus. The fables of the ancients concerning the lotus-eaters are well known. They were represented as a mild, hospitable race of men, in northern Africa, who lived on the lotus berry (hence their name, from *lōtos*, and *phagein*, to eat), which had the power of making strangers who ate it forget their native country.

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LOUDNESS, an expression of the magnitude of the nervous effect produced by a sound. Experiment seems to show that the loudness of a sound varies inverse'y as the square of the distance from the sounding body, and as the amplitude of vibration of the particles of air conveying the sound is known to vary inversely as the distance from the sounding body, it is usual in physics to say that the loudness of a sound varies as the square of the amplitude. It seems, therefore, that loudness depends on the strength of the blow which the drum of the ear receives.

LOUDON, JOHN CLAUDIUS, an eminent horticulturist, was born at Cambuslang, in Lanarkshire, on 8th April, 1783. At the age of fourteen he was placed with a nurseryman and landscape gardener in Edinburgh, and at the age of twenty set out to seek his fortune in England, carrying letters of recommendation with him to some of the principal gentry. His professional career as an ornamental gardener was remarkably successful, and he soon also became distinguished as an author, his first publications being Observations on Laying out the Public Squares of London, inserted in the Literary Journal (1803); Observations on the Formation and Management of Useful and Ornamental Plantations, (1804); A Short Treatise on some Improvements lately made in Hot-houses (1805); and A Treatise on Forming, Improving, and Managing Country Residences (1806). This last work was illustrated by thirty-two copper-plate engravings, drawn by the author. In 1807 he became, in conjunction with his father, tenant of the farm of Woodhall, near London; and in 1809 he leased the farm of Tew Park, in Oxfordshire, from General Stratton. Having in 1813 accumulated by his exertions a moderate fortune, he set out on a tour on the Continent, but on his return found that the greater part of his savings had been dissipated by the insecurity of their investments, and he accordingly found himself obliged to begin the world anew. A great literary work was now resolved on, and in 1822 appeared the Encyclopædia of Gardening, a book containing a vast amount of information, and which both attained a great sale and established Mr. Loudon's reputation as an authority in horticultural matters. A new and improved edition was published in 1824, and the following year the Encyclopædia of Agriculture gained him fresh laurels. In 1826 he commenced the Gardener's Magazine, the first periodical which had appeared exclusively devoted to horticulture, and which he edited till his death. About this time, however, his health had become seriously undermined, the effects of a rheumatic fever, which had first attacked him in 1806. He notwithstanding continued his literary labours with unabated zeal, and edited Loudon's Magazine of Natural History, from 1828 till 1836; but the work which he intended to be a *chef d'œuvre*, his Arboretum et Fruticetum Britannicum, an illustrated description of every British tree and shrub, proved a most disastrous undertaking. It was published in 1838, at his own risk, and after paying the artists and other persons engaged on it, this magnificent work involved its projector in a debt of £10,000, besides hastening his end, by the cares and anxieties to which its preparation had subjected him. Among his last literary works were the Suburban Horticulturist; an edition of Repton's Landscape Gardening; an Encyclopædia of Trees and Shrubs; and a treatise on Cemeteries. He expired of disease of the lungs, at Bayswater, on 14th December, 1843. Mr. Loudon was married in 1831 to Miss Jane Webb, daughter of Thomas Webb, Esq., of Ritwell Hall, near Birmingham. This lady had distinguished herself in the literary world by the publication in 1827 of a remarkable novel, entitled The Mummy. After her marriage to Mr. Loudon she became an invaluable assistant to him in his literary labours, acting as his amanuensis, contributing to his works, and generally aiding him enthusiastically in every possible way. Subsequently to his death she edited several reissues of his writings. She is also the author of several botanical and horticultural works, principally intended for her own sex, and all of which have been extremely popular. These are—Gardening for Ladies (London, 1840); British Wild Flowers (1846); Ladies' Companion to the Flower Garden (5th edition, 1847); and Botany for Ladies (1849). She died in London, on 13th July, 1858.

LOUGHBOROUGH, a market-town of England, in the county and 10½ miles N.N.W. Leicester, a station on the Midland Railway. Its streets are straight and very clean, houses mostly of brick; there is a neat little market-place, and the town altogether has a thriving appearance. It has a large town-hall, three elegant churches, a handsome Roman Catholic and various Dissenting chapels, a grammar-school, known as the Burton Foundation, and dating from 1495, and several other schools (including a school of science and art), an infirmary and dispensary, a literary and scientific society, &c. The principal manufacture of the town consists of hosiery of all kinds, in which several thousand persons are employed. There are also a famous bell-foundry, several dye-works, malt-kilns, brick-works, corn-mills, saw-mills, and iron-foundries. Pop. (1881), 14,733.

LOUGHREA, a market-town of Ireland, county Galway, beautifully situated on an acclivity on a small lake of same name, 21½ miles east by south of Galway. It has an Episcopal church, a Roman Catholic chapel, a Carmelite monastery, with a neat chapel; a Carmelite nunnery, a large convent of the Sisters of Mercy, and a court-house. It has a considerable trade in the produce of the district. Loughrea was once fortified, and the remains of its walls may still be traced; it also contains the remains of an old castle and of a monastery, founded in 1300. Pop. in 1881, 3159.

LOUIS I., surnamed *Le Débonnaire*, the son of Charlemagne, born in 778, was early appointed by his father King of Aquitania, and in 813 was named joint-regent of France, of which, in the following year, he became sole sovereign, as well as Emperor of the West. In 817 he divided his whole dominions among his three sons, and thereby gave rise to disturbances and contests which lasted during the whole period of his reign. This division led to a revolt on the part of his nephew Bernard, king of Italy, who considered himself unduly curtailed in his possessions. Louis succeeded in 818 in alluring him to Châlons, and put out his eyes, so that he died a few days after, and Italy was given to Lotharius. No sooner had the emperor thus wreaked his vengeance than he repented of the atrocity, and he wished to resign and retire to a monastery. His spiritual advisers induced him to do public penance at Attigny, and brought him so completely under their influence that he did nothing without consulting them. In 829, in consequence of the urgent solicitations of his second wife, Judith of Bavaria, who had born him a son, he made a new division of the empire. Soon after, in 830, the brothers Lotharius and Pepin combined against their father, declared open war, took him prisoner at Compiègne, charged their stepmother with adultery, and shut her up in a monastery. The design of Lotharius to make himself sole sovereign, having been discovered, the diet of Nimeguen obliged him to submit at discretion. Louis indeed pronounced his forfeiture, deprived him of the joint-regency, brought Judith from the monastery, and gave her son Charles Aquitania, which had hitherto

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been held by Pepin. This led to a new insurrection on the part of Louis and Pepin, who were soon after joined by Lotharius. In 833 the two parties encamped with their armies in Alsace, not far from Colmar. The emperor lost the favourable moment for fighting, and he was made prisoner by his sons. He was separated from his wife, who was sent into Italy, and his son Charles was carried to a monastery, and there confined. Louis, taken prisoner to Soissons, was obliged by Lotharius to abdicate the throne. But he still hoped for rescue; nor was he obliged to wait long. The brothers, offended by the ambition of Lotharius, united against him, drove him from the throne, and reinstated their father. Judith and Charles returned, and Louis, after being crowned anew, published an amnesty to his rebellious nobility, and banished Lotharius to Italy. In 837 he made a new division in favour of Charles, who obtained Neustria in addition to Aquitania. The other sons submitted in silence; but when Louis, after Pepin's death in 838, excluding his children, gave West Franconia to Charles, and Italy, together with all Austrasia or Germany proper, to Lotharius, Louis, the son, who in this way lost everything but Bavaria, felt so deeply injured that he took up arms. The emperor wished to effect a pacification at a diet to be held at Worms, but worn out with grief and anxiety, died in 840, on an island of the Rhine, below Mainz, after sending to Lotharius the imperial crown, his sword, and his sceptre. Though not without good qualities and great knowledge and experience, he had neither the statesmanship nor decision necessary for the sole ruler of so large an empire. He was succeeded as emperor by Lotharius, to whose protection he had recommended his favourite son Charles.

LOUIS THE GERMAN, the third son of Louis le Débonnaire, born about 805, King of Germany from 843–876, and the founder of an independent German empire, obtained in 817, on the first division made by his father, Bavaria and the lands bounding it on the east, but soon saw himself in the two new divisions made in favour of his younger brother Charles, so harshly treated and curtailed, that he joined his brothers Lotharius and Pepin in the war which they had so long waged against their father. After the father's death in 840 a war commenced between the brothers as to the succession, which Lotharius had appropriated almost entirely to himself. Louis found himself opposed to Lotharius and Charles, who united against him, defeated him in 841 in the battle of Fontenai, and compelled him to make a treaty at Verdun, by which, though he was obliged to give up several of his conquests, he was formally acknowledged sovereign of Germany beyond the Rhine, and moreover of Mainz, Spires, and Worms. While sovereign of Bavaria he was obliged to make head against the Bulgarians and other Slavonic races endeavouring to force an entrance from the south-east, and he was now involved in similar struggles with the Normans, who, returning yearly to the Rhine and Friesland, obliged him at last, in 858, after laying Hamburg in ashes, to unite the archbishopric of Hamburg with the bishopric of Bremen. The same year, on the invitation of a faction dissatisfied with Charles the Bald, he marched out from Worms with three divisions, gained possession of France, and had thus a momentary prospect of becoming master of both East and West Franconia. But Charles having in the meanwhile collected a body of adherents in Burgundy, compelled Louis, who was abandoned at a decisive moment by the French troops, to withdraw from France. In 862 a severe blow was given to his feelings by the insurrection of his son Carlmann, but on the death of Lo[illegible]raine he succeeded in obtaining possession of half of his territories by a pacific arrangement with Charles the Bald. On the other hand his brother Charles, on the death of Louis II., eldest son of Lotharius, engaged in a course of intrigues to secure the imperial throne, and Louis, while hastening to punish him for his treachery, was seized with sudden illness, and died at Frankfort in 876. His dominions were shared by his three sons, Carlmann taking Bavaria, Carinthia, and the adjoining lands of the Slaves; Louis the Younger, Franconia, Thuringia, Saxony, and Friesland; and Charles le Gros, Swabia from the Main to the Alps.

LOUIS IX. (St. Louis), King of France, eldest son of Louis VIII. and Blanche of Castile, born at Poissy, April 25, 1215, came into possession of the government in 1226, and remained for a time under the guardianship of his mother, who was at the same time regent of France. Louis summoned to his council the most able and virtuous men, composed the disturbances in Brittany, preserved a wise neutrality in the quarrels of Gregory IX. and Frederick II., and was always intent upon promoting the happiness of his subjects. The wise management of his states enabled him to levy a powerful army against Henry III. of England, whom he defeated twice in the course of six days, and forced him to a disadvantageous peace. In the year 1244, when sick of a dangerous disorder, he made a vow to undertake a crusade to Palestine; and neither his mother nor wife was able, four years after, to prevent him from fulfilling this vow. In August, 1248, he sailed with his wife, his brothers, and 40,000 men to Cyprus, and in the following year proceeded to Egypt. Landing at Damietta, in 1249, he took this city, and afterwards twice defeated the Sultan of Egypt, to whom Palestine was subject. But famine and contagious disorders soon compelled him to retreat; his army was almost entirely destroyed by the Saracens, and himself and his followers carried into captivity. The sultan demanded for the ransom of the king and his lords the restoration of Damietta and 1,000,000 gold Byzantines. Louis restored Damietta as the ransom of his own person, paid 800,000 Byzantines (about 100,000 marks of silver) as the ransom of his followers, who had dwindled down to 6000 men, and concluded a truce of ten years (May 7, 1250). It was not till the year 1254 that Louis returned to France, and in the interval Queen Blanche, who had ruled the kingdom in an exemplary manner, had died. Louis again turned his attention to the administration of the laws, which, until this time, had been left entirely to the caprice of the barons. The subjects could now appeal from the decision of their lords to four royal tribunals, and men of learning were introduced into the parliaments, whose members had till now been composed of illiterate barons. Louis likewise diminished the taxes, which had exhausted the wealth of the subjects. In March, 1268, he published his pragmatic sanction, which secured their rights to the cathedral churches, though, when occasion required, he repressed the arrogant pretensions of the clergy. About 1270 he drew up a code of laws, known as the Établissements de St. Louis. The high character which Louis IX. bore among his contemporaries may be seen from this, that Henry III. of England and his barons, in 1264, selected him as the arbiter of their disputes. After he had united to his dominions several French provinces which had hitherto been under the dominion of England, he determined, in 1270, to undertake another crusade. He sailed to Africa, besieged Tunis, and took its citadel. But a contagious disorder broke out, to which he himself (Aug. 25, 1270), together with a great part of his army, fell a sacrifice. In 1297 he was canonized by Boniface VIII.

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LOUIS XI., King of France, was the eldest son of Charles VII., and was born at Bourges, July 3, 1423. At the age of thirteen years he married Margaret of Scotland, who died nine years afterwards. Active, bold, and cunning, he was the reverse of his well-disposed but imbecile father. In 1439 he left the court, and put himself at the head of an insurrection at Niort, known under the name of *La Praguerie*. Charles defeated the rebels, executed some, but pardoned his son, whom, in 1440, he made governor of Dauphiny. Contrary to the will of his father, in March, 1451, he married Charlotte, daughter of the Duke of Savoy, and entertained a treasonable correspondence with some of his father's courtiers. His father, however, obliged him to flee to Burgundy, and he lived five years at Genneр, in Hainault, in a dependent condition. Charles VII. died in 1461, and Louis hastened to Rheims to be crowned. The ministers of his father were dismissed, and men of the lower orders assumed their places. He had sworn not to increase the taxes, but soon broke his oath, and in consequence insurrections broke out at Rheims, Alençon, &c.; but they were soon quelled, and followed by many executions. He now made a tour through the south of his dominions, supported the King of Arragon in his usurpation of Navarre, and obtained the cession of Roussillon and Cerdagne. His policy became more and more evident. Whilst he pretended to reconcile contending parties, he secretly instigated them against each other; and whenever he had a meeting with a foreign prince he corrupted his courtiers by bribes, and established secret correspondences with them. His vassals rebelled against him on account of his treatment of Francis II., duke of Brittany, whom he attempted to deprive of his rights. The duke, being taken by surprise, had promised everything required of him, but encouraged the Dukes of Lorraine, Bourbon, Alençon, Nemours, Burgundy, and the king's brother, the Duke of Berri, to conclude the *ligue du bien public*, which, in 1465, began open hostilities. The Burgundians besieged Paris, and the king could force his way to his capital only by means of the battle of Montlhéry. But Louis extricated himself, on this as on other occasions, by artful treaties, which he never observed longer than he was compelled to. He consented to yield Normandy to his brother, part of Picardy to Burgundy, &c.; but no sooner was the league dissolved than he declared that Normandy could not be severed from France, and forced his brother to seek refuge in Brittany. The duke, however, was too weak singly to maintain the struggle against the king, and signed a sort of capitulation just as Charles the Bold, the young Duke of Burgundy, approached with an army to his relief. Louis, who might have risked a battle with Charles, preferred negotiation, which, however, proceeding slowly, he requested a passport from the Duke of Burgundy, and actually went to visit him at Péronne. He had just before secretly instigated the people of Liége to rise, and promised them aid. Charles, having discovered this act of treachery, was furious with rage, and hesitated three days (during which he kept the king in prison) as to what course he should adopt. Nothing but the greatest presence of mind on the part of Louis, who asserted his innocence under the most solemn oaths, saved him. A peace was concluded on favourable terms for Charles and his allies; but when Louis returned to Paris he used every artifice to evade its fulfilment. He had promised to cede Champagne to his brother, but persuaded him to take Guienne instead. The Duke of Burgundy, irritated at this conduct, secretly concluded an alliance with England and Brittany. Meanwhile Louis XI. had become the father of a prince (afterwards Charles VIII.), and his brother having lost all hope of ascending the throne of France renewed his connections with Burgundy. Louis obtained information of these proceedings, and soon after the Duke of Berri died of poison administered in an apricot. It never has been doubted that the king was the perpetrator of the crime, of which the Duke of Burgundy openly accused him. The war broke out between them with renewed fury, but an armistice was soon after concluded, in which the Duke of Brittany was included. The King of Arragon, who had also waged war against Louis, was not a party to this treaty, and the French king now turned his arms against that prince, from whom he wrested a large extent of territory. During the armistice Charles had attacked Neuss, with great loss. Louis united with the emperor Frederick III. and the Swiss, and attacked Burgundy in 1475. He concluded a truce of seven years with Edward IV. of England, who had hastened to assist Charles, by the promise of a sum of money and a pension, and of marrying the dauphin to an English princess. Burgundy and Brittany soon after concluded another armistice with him, by which St. Quentin was ceded to Louis. After the death of Charles the Bold before Nancy in 1477, Louis took possession by force of a considerable part of his dominions as vacant fiefs of France, and rejected the proposed marriage of the daughter of Charles, then twenty years old, with the dauphin, who was but ten years of age. Maximilian, son of the Emperor Frederick III., obtained the hand of that princess, with a part of her dominions, and defeated the forces of Louis at Guinegate in 1478. After protracted negotiations peace was finally concluded, December 23, 1482. It was agreed that the dauphin should marry Margaret, daughter of Maximilian, and receive the counties of Artois and Burgundy. In 1481 Louis, who had been twice affected by apoplexy, haunted by the fear of death, shut himself up in his castle of *Plessis-les-Tours*, gave himself over to superstitious and ascetic practices, and died August 30, 1483.

The great object of Louis was the consolidation of France, the establishment of the royal power, and the overthrow of that of the great vassals; and he neglected no opportunity and spared no crime to effect his purpose. The chronicles of the time enumerate 4000 people who were executed during his reign, and his cruelties were often studied. But he encouraged commerce as much as the ignorance of his times allowed, was extremely active, and attended to everything connected with the affairs of state. The contradictory traits of his character occasioned a singular opposition in his tastes and feelings. He was at the same time confiding and suspicious, avaricious and lavish, audacious and timid, mild and cruel. Louis XI. was the first French monarch who assumed the title of *Most Christian King*, which was given him by the pope 1469. He encouraged learning, and was himself an author, Les Cent Nouvelles nouvelles, an imitation of the Decameron; and the Rosier des Guerres, a manual of instruction for his son, being attributed to him.

LOUIS XII., King of France from 1498 to 1515, called by his subjects *le Père du Peuple*, was born at Blois, 27th June, 1462. He was the son of Charles, duke of Orleans, grandson of Charles V. and of Marie of Cleves. Before his accession to the throne, which took place after the death of Charles VIII., he was Duke of Orleans and first prince of the blood. He united the Duchy of Brittany for ever with the crown by marrying in 1499 the widow of Charles VIII. after divorcing Jeanne, daughter of Louis XI., whom he had been forced to marry, and who had born him no children. In order to enforce the

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rights which he inherited from his grandmother Valentina Visconti to the Duchy of Milan against Lodovico Sforza, he sent in 1499 an army over the Alps, which conquered the Duchy of Milan within twelve days; after which Genoa also surrendered to him. Sforza was taken prisoner, and died in 1510 in confinement at Loches in France. In 1500 Louis XII. concluded a treaty with Ferdinand the Catholic by which the Kingdom of Naples was divided between them. King Frederick of Naples proceeded to France, where Louis gave him a considerable annuity. But Ferdinand possessed himself of the whole Kingdom of Naples, and retained it by the Treaty of 1505. The League of Cambray, established by Pope Julius II. against Venice in 1508, involved France in a new war. Louis now commanded the army in person, and was victorious over the Venetians at Agnadello in 1509, where he fought with great bravery. Julius II., however, fearing the power of France in Italy, concluded the Holy League with Venice, Switzerland, Spain, and England, against Louis XII. in 1510. The French armies could not maintain themselves after the death of their general Gaston de Foix; they were beaten by the Swiss at Novara in 1513, and retreated over the Alps; after which Maximilian, son of Lodovico Sforza, took possession of Milan, and Genoa made herself independent of France. The Swiss at the same time penetrated into France as far as Dijon, and Henry VIII. of England defeated the French in 1513 at Guinegate (Battle of the Spurs, because the French made more use of their spurs in flight than of their swords in fight). Ferdinand the Catholic also in 1512 had taken Upper Navarre, which until then belonged, together with Lower Navarre in France, to the house of Albert. Louis XII. now renounced the provinces on the other side of the Alps and the Pyrenees, became reconciled with Leo X., the successor of Julius II., and concluded in 1514 a general peace with Henry VIII., whose sister Mary he married after the death of Anne. From love to his beautiful wife (only sixteen years old) Louis (then fifty-three years of age) changed his whole mode of life to the injury of his health, and thus accelerated his death, which occurred January 1, 1515, not quite three months after his marriage.

LOUIS XIII. (surnamed the *Just*), the son of Henry IV. and Maria de' Medici, was born 27th September, 1601. He ascended the throne May 14, 1610, after the murder of his father, his mother being made guardian of her son and regent of the kingdom. France soon became the prey of internal parties and civil dissensions, which the Florentine Concino Concini, Maréchal D'Ancre, prime minister at that time, was utterly unable to suppress. The disturbances rose to the highest when the king, in 1615, married Anne, daughter of Philip III., king of Spain. The Prince of Condé abandoned the royal party, and took up arms in conjunction with the Huguenots. The king made peace with the prince, but sent him to the Bastille some time after, whereby another civil war was kindled, in which, however, the insurgents had no success; and the Marshal D'Ancre, whom the young king hated, being murdered with his connivance (1617), tranquillity appeared to be again restored. (See LUYNES.) A civil war arose between the king and his mother, and during these disturbances the Huguenots rose in arms, and a great part of the kingdom rebelled against the king, who now delivered himself up to the guidance of the Cardinal Richelieu. Both parties feeling deeply the necessity of repose, peace was again concluded between the king and the Huguenots (1623), but it was not of long continuance. Rochelle, the head-quarters of the Huguenots, revolted, and was supported by England. The king drove the English to the sea, and at last (October 28, 1628) captured Rochelle, which had defended itself for more than a year. The only brother of the king, Gaston of Orleans, now revolted against him, in conjunction with the queen mother. The insurgents were nevertheless defeated; the Duke of Montmorenci, in alliance with Gaston, was vanquished in the battle of Castelnaudary, September 1, 1632; taken prisoner, and executed at Toulouse October 30 of the same year. Gaston received a pardon. Louis was now induced by Richelieu to take part in the Thirty Years' war, and supported Gustavus Adolphus against the Spaniards and Austrians. In 1636 he expelled from his dominions the Spaniards, who had landed in Provence, and the imperial troops, which had penetrated as far as Burgundy. The events of the following year were yet more favourable to France, but the exhausted state of the finances opposed an insuperable obstacle to the progress of the French arms. In this state of misfortune Louis XIII. died May 14, 1643, having lost his great minister on the 4th December of the previous year.

LOUIS XIV. (known as *Louis the Great*), son of Louis XIII. and Anne of Austria, was born at St. Germain-en-Laye on the 5th of September, 1638, and before he was five years old succeeded his father May 14, 1643. As he was born after a sterile marriage of twenty-three years, some doubts have been thrown on his legitimacy; and as his birth appeared a kind of miracle, he was surnamed *Dieudonné*, or God-given. His education was shamefully neglected, certainly at the instance of Mazarin, who was in reality the governor of the state, and ruled under the name of the queen mother. His minority was occupied by the continuation of the wars against Austria; by the victories of Condé—victories crowned by the Treaty of Westphalia; by the struggles of the parliament against the regent and Mazarin; by the bloody troubles of the Fronde; the revolt of Condé, &c. In 1659 peace was concluded with Spain by the Treaty of the Pyrenees, one of the clauses of which provided for a marriage between the Infanta Maria Theresa of Austria and the King of France. On the death of Mazarin (9th March, 1661) Louis XIV. announced to his council his intention to reign for the future by himself and without a minister; and to the surprise of all one who was supposed to be wholly given up to frivolous pleasures sustained for fifty-four years the entire burden of sovereign rule. He carried into effect with signal energy a policy of pure despotism, his favourite maxim being *L'État, c'est moi* (I am the state). In fact no French monarch was ever more exclusively the master of the nation. One of Louis' first thoughts was to crush Fouquet, the comptroller of the finances, whose enormous robberies and monstrous power were a public scandal. He was thrown into prison, and his place was taken by Colbert, who, under the simple title of superintendent, was in reality the moving spring of the administration. During the most brilliant period of his career, that is, from 1661 to 1672, he accomplished a series of financial reforms, suppressed useless offices, created the Company of the Indies, made roads, dug canals, and founded manufactures. The age of Louis XIV. is known as the Augustan age of French literature, during which flourished Corneille, Descartes, Racine, Pascal, La Fontaine, Bossuet, Fénelon, Boileau, Lebrun, Lesueur, Malebranche, Vauban, Puget, Turenne, Cassini, Mabillon, Ducange, Molière, Mme. de Sevigné, Nicole, Bourdaloue, La Rochefoucauld, Lenostre, Mansart, Perrault, &c. One of the first acts of Louis after the death of Mazarin was secretly to strengthen the Portuguese against Spain, in violation of the Treaty of the

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Pyrenees, and to associate England with him in this work—a short-sighted policy which gave England the protectorate of Portugal, with the possession of Tangiers and Bombay. In October, 1662, he purchased Dunkirk for 5,000,000 livres from the needy Charles II.; and having had a dispute with Rome in February, 1664, Pope Alexander VII. submitted to the most humiliating conditions. His father-in-law, Philip IV. of Spain, died in September, 1665, when Louis, in name of his wife, advanced a claim to the Spanish Netherlands, and in consequence of his pretensions being rejected, he entered on a campaign, May, 1667, and accompanied in person an army commanded by Turenne. He took Charleroi, Tournai, Douai, Courtrai, and Lille, and in three weeks possessed himself of the whole of what was afterwards known as French Flanders. In February, 1668, Condé took Franche-Comté almost without striking a blow, which was, however, almost immediately restored to Spain by the Treaty of Aix-la-Chapelle, the work of the triple alliance of Holland, England, and Sweden. He now formed the idea of destroying Holland, and declared war 6th April, 1672. In a few weeks he had conquered three provinces—Gueldre, Overyssel, and Utrecht. The Dutch proclaimed William of Orange stadtholder, who undertook the national defence; and to check the ambition of Louis, the emperor, Spain, Denmark, &c., concluded the *grande alliance*. Still the Treaty of Nimeguen (11th August, 1678) left Louis in possession of Franche-Comté and a part of Flanders. Meanwhile Colbert was attempting, not without success, to relieve France from her financial embarrassments. Louis was now at the height of his glory, and France regarded him as almost divine. Hence his perfect tranquillity of conscience in the midst of his numerous adulterous *liaisons*, the fruit of which he solemnly legitimated. Maria Theresa having died in 1683, he secretly married Madame de Maintenon about 1684 or 1685. She was then almost fifty years of age. She is said to have had a considerable part in the revocation of the Edict of Nantes and in the subsequent persecutions of the reformers. The expulsion of these, a work as much of folly as of cruelty, seriously weakened France by depriving her of many of her most industrious and ingenious children. The League of Augsburg was now formed against Louis, the members of it being the empire, Spain, Holland, England, Sweden, &c. William of Orange was now on the throne of England, and Louis was preparing to restore James II., when the decisive defeat of James at the Boyne, and the naval disaster at La Hogue, established William firmly in the sovereignty. The general war continued with frequent and severe losses to the French till the Peace of Ryswick (1697), by which Louis was to restore all his recent conquests and the acquisitions made since the Peace of Nimeguen, with the exception of Strasburg and the domains of Alsace. The result of the long contest was that France was diminished and exhausted, and she had soon to prepare herself for new sacrifices in the war of the Spanish Succession. The King of Spain, Charles II., in dying had nominated as his successor his grand-nephew Philip of Anjou, son of the dauphin of France. In spite of the certain perils which it offered, Louis accepted this legacy. The whole of Europe armed itself anew against Louis, and entered on a general war against France and Spain, directed by the triumvirate Marlborough, Eugène, and Heinsius. The principal episodes of the war were the disasters of Blenheim, Ramillies, and Malplaquet. The victory gained at Denain by Marshal Villars over the imperialists in 1712 led to the Treaties of Utrecht (1713), of Rastadt, and of Baden (1714), by which France agreed to give up several towns in Flanders, a part of her colonies, and to fill up the harbour of Dunkirk. The close of the reign of Louis XIV. is lamentable. It is filled with theological wars, with persecutions against the Jansenists, with ridiculous disputes about the bull Unigenitus, with those about Quietism—in short, with those numberless trifling incidents which characterize periods of decay. Louis, who had lost in succession his son the dauphin, his grandsons the Duc de Bourgogne and the Duc de Berry, died on the 1st of September, 1715, after a short illness. The works of Louis XIV. (six vols. Paris, 1806), containing his Instructions for his sons and numerous letters, furnish important information as to his character and the history of his reign. The exaggeration of flattery heaped on him during his lifetime and subsequently was in some measure justifiable, for he was undoubtedly a remarkable prince, and possessed not only superior but valuable qualities. His activity, intelligence, and regular and methodical discharge of business, vindicate his title to the reputation of having been a great prince. He readily discovered ability in others, and availed himself of their services. He possessed constant equanimity both in prosperity and adversity, and had always full self-command.

LOUIS XV., the great-grandson of Louis XIV., and only surviving son of the Duc de Bourgogne, was born February 15, 1710, and commenced his reign in 1715. He married in 1725 Maria, the daughter of Stanislaus Leczynski, the dethroned King of Poland. By his licentiousness, bigotry, prodigality, and despotism Louis rendered the evils of the state incurable. The age which educated and corrupted him, and on which he and his court reacted in a not less injurious manner, explains not only the origin, but also the spirit and malignity of the revolution. A great part, however, of this fault falls on the regency, administered by Philip, duke of Orleans, and the Cardinal Dubois, till 1723. (See ORLEANS, PHILIP OF.) During the regency the country was brought to the verge of ruin by the folly of the regent, and the rash financial schemes of the famous LAW (see LAW, JOHN), by intermeddling with which 500,000 citizens were reduced to bankruptcy. In his seventh year Louis was first placed under the care of men, his education being intrusted to Marshal Villeroi and Cardinal Fleury, the latter of whom acquired the entire confidence of Louis, who, after the death of the regent in 1724, appointed the Duke of Bourbon chief minister of state. Till now the king, who entered upon the government himself in 1723, had shown no will of his own. But when the party of the duke attempted to get rid of the prelate the king acted with such firmness, that in 1726 Fleury was placed at the head of the administration. He declined the title of first minister, but was in fact such till his death. A great change now took place in the private life of Louis, who abandoned himself without reserve to sensual pleasures and the luxury of a court life. Contrary to the will of Fleury France was involved in a war in support of the claims of Stanislaus to the throne of Poland. After the death of Augustus II. in 1733 Louis declared that the freedom of election should be interrupted by no foreign power; but the Emperor Charles VI. having concluded an alliance with the Elector of Saxony, and supported his election as King of Poland, Louis's plan was frustrated, and a war broke out. After two campaigns France acquired for Stanislaus the possession of the Duchy of Lorraine, by the preliminaries of Vienna, in 1735. After the death of Charles VI. in 1740, the war of the Austrian Succession broke out, the success of which was frustrated by the parsimony of the minister, then eighty years old. The French losses by land were great, but still greater

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were the losses by sea; for Fleury had neglected the marine. After his death in 1743 the victories of Count Maurice of Saxony gave new splendour to the French arms; and by the Peace of Aix-la-Chapelle, in 1748, France regained her lost colonies. But the state was exhausted by an unjust and impolitic war. Louis had himself taken a part in several campaigns, and when he was attacked at Metz by a severe malady received the appellation of the well-beloved (*le bien-aimé*). The affection felt for him by the French exceeded his deserts, for he became from this time more and more unworthy of the public respect, sinking into the grossest indolence and sensuality, and abandoning the management of state affairs to Madame de Pompadour. (See POMPADOUR.) She was in reality the ruler, the monarch being absorbed in his orgies, or childish amusements and despotic fears. His sensuality put him entirely in the power of the ambitious concubine. While she made him lead the shameless life of an eastern monarch, she sacrificed the honour, wealth, and the prosperity of the state; and accustomed the king to the *acquits de comptant* or warrants for payment, which exhausted the treasury, and introduced confusion into the accounts. The cost of the *parc-aux-cerfs*, as it was called —said to have been a kind of royal harem—was defrayed by such *acquits*, which amounted eventually to 100,000,000 livres. From the year 1769 he was governed by Madame Du Barry, who is said to have cost the royal treasury in five years 180,000,000 livres. As Louis became older his bigotry and apathy increased, while he sank deeper in sensuality. The public contempt was expressed in satires, caricatures, and songs, to which the people had already become accustomed under the regency. The hatred of the people gave credence to the most exaggerated accusations, and Louis, from fear and aversion, withdrew himself from the public eye. France saw itself involved in 1754 in a maritime war with Great Britain, on account of the forts on the Ohio, and, as if this contest was of no importance, rashly took the side of Austria against Prussia in 1756. The French suffered great losses by sea and land, and after seven unhappy years they had reason to congratulate themselves when the Duke de Choiseul, prime minister, concluded a peace with Great Britain at Fontainebleau in 1762. The definitive treaty was settled at Paris in 1763, although France had to relinquish to Great Britain Canada as far as the Mississippi, Cape Breton, and the islands Grenada, Tobago, St. Vincent, and Dominica, together with Minorca. The famous family compact of the Bourbons, by which Choiseul hoped in the course of the war (1761) to unite for ever the policy of Spain, Sicily, and Parma with the French interest, was of no great benefit to France. After the war Choiseul's ministry was marked by the expulsion of the Jesuits from France in 1764, and by the acquisition of Corsica in 1769. Shortly after Mme. du Barry, in connection with the Chancellor Maupeou, effected the overthrow of the Duke de Choiseul, and elevated to his post the Duke d'Aiguillon. The quarrel of the latter with the parliament at Rennes, which had written against him in a violent tone, as former Governor of Bretagne, and the refractoriness of all the parliaments, especially with respect to the new oppressive financial edicts, induced the king in 1771 to banish the members of the parliament from Paris, and soon after to abolish the parliaments entirely, which were first re-established under Louis XVI. in 1774, with certain limitations. A worthy counterpart of Maupeou was the comptroller-general of finances, the Abbé Terrai, who impoverished the country while he received an income of 1,200,000 livres. In proportion as the king was despised at home, the authority of France was lessened abroad. The partition of Poland took place in 1773 without the knowledge of France. After having sunk into a complete nullity, the king, whom no domestic misfortunes, not even his own attempted assassination in 1757 by a fanatic, Damiens (see DAMIENS), nor the public misery, could restore to consciousness, died, 10th May, 1774, of the smallpox, caught of a young girl, by whom Madame du Barry wished to dispel his melancholy, leaving a debt of 4,000,000,000 livres.

LOUIS XVI., grandson of Louis XV., was born Aug. 23, 1754, and in 1770 married Maria Antoinette of Austria. He ascended the throne 10th May, 1774, at the age of hardly twenty years. In regard to morality his character was strongly contrasted with that of the previous king. He was upright, pious, and kind-hearted; but his weakness and want of decision made him very unfit for wielding the sceptre of a great country, especially during a crisis like that through which France was about to pass. He chose Count Maurepas his minister of state, a man of talent and experience, but of little solidity of character; and he committed the financial department to the enlightened, able, and upright Turgot, who resolved to remedy the abuses of the state by thorough reforms on strict philosophical principles, and who looked upon the privileged orders as the sources of all evil. The most oppressive feudal services, arbitrary exactions, and the rack were abolished, and many useful regulations established; but Turgot could not overcome the king's dread of an open struggle with the clergy, the nobility, and parliament. These bodies united against the minister, and the people, which was on his side, could not afford any assistance against such a league. The coronation of the king, 11th June, 1775, was followed by the appointment, as minister, of Malesherbes, who was the friend of Turgot. The great stumbling-block of Louis' administration was the deficiency in the treasury, and the debt of 4,000,000,000 livres left by his grandfather. The deficit produced by the payment of debts, and the expenses of the coronation in 1775, inspired Louis with distrust of Turgot's philosophical views. Malesherbes gave in his resignation. Turgot was obliged to follow his example. The privileged party was victorious, but the hatred of the third estate, and the desire of all enlightened and well-disposed persons for a thorough reform was increased. They did not wish to overthrow the whole system, until the North American revolution threw a firebrand into this inflammable mass. The day on which Louis concluded the treaty with the United States, Feb. 6, 1778, decided his fate, for the war to which it gave rise, from 1778 to 1782, and which cost France 1,400,000,000 livres, accustomed the nation and army to republican ideas, and produced a cureless deficit. Louis himself was averse to engaging in this war; but he was outvoted in the council of state, the ministers hoping to establish French commerce on the overthrow of the British.

After Turgot's removal the extravagance of the court increased; and while Louis refused himself any great expenditure, he yielded too easily to the tastes of the queen and the princes of the blood. He paid the debts of Count Artois. The queen also gave herself up to her love of gaiety, and the festivals of Versailles and Petit Trianon were on a scale of lavish magnificence. Maurepas either did not see whither all this must lead, or, with characteristic levity yielded to necessity. He remained the directing minister till his death, Nov. 21, 1781. The changes in the ministry of the finances, which was committed in turn to Clugny, Taboureau, Necker, Joly de Fleury, and D'Ormesson, increased the confusion. The existence of great abuses was notorious, but the extir-

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pation of their deep-rooted causes was superlatively difficult. The dismissal of Necker, who had become an object of great dislike by his striking and satisfactory *compte rendu*, was considered as a public misfortune by the third estate, whose favour Necker had exerted himself to acquire. Thus, long before the revolution a real anarchy prevailed in public opinion, which penetrated even to the council of state. After the Peace of Versailles in 1783, the courtly and pliant Calonne was appointed minister of finance. Meanwhile the exclusive restriction of the higher ecclesiastical dignities and benefices, and of the various grades of military rank to the nobility, had highly incensed the populace against the court and higher classes. In consequence of the infamous affair of the diamond necklace the process against Cardinal Rohan was commenced in 1785, and the grossest calumnies were disseminated against the queen, which were but too easily credited by the people. By this means the throne was disgraced in public opinion, and in this fermentation of public sentiment Calonne persuaded the king to convene the notables in order to find some resources for the exhausted treasury. On the 22d February, 1787, the king opened the assembly with a speech, which was not favourably received. The deficit, which the comptroller-general had stated at 112,000,000 livres, but which was estimated at more than 140,000,000, rendered Calonne's plans suspected. An opposition was formed, and Calonne received his dismissal. Parliament refused the imposition of two new taxes, which would have been burdensome to the large landed proprietors, and demanded the convocation of the estates, a demand seconded even by the clergy. Brienne resigned, and Necker entered the council in 1788 as minister of finances. Louis convened a second time the notables, to settle the form of the estates and the manner of voting. May 5, 1789, the states-general met. Amidst the conflicts of the privileged orders and the new opinions the king remained gentle and timid, deserted and alone. His sole object was the common weal; but the democrats hated him as a king, and the aristocrats deemed him incapable of governing. The 12th, 13th, and 14th of July, 1789; the night of August 4; the horrors of the 5th and 6th of October; the flight of the king, June 21, 1791, intercepted at Varennes, 60 leagues from Paris, when Louis, from his hesitation to use force, prevented the success of Bouillé's plan for his escape; the acceptance of the constitution of September 14, 1791, which declared his person inviolable; the attack of the populace of Paris on the royal palace, June 20, 1792, when he with equal firmness and dignity rejected the demands of the insurgents; and on the 22d openly declared that violence would never induce him to consent to what he considered hurtful to the general welfare; the catastrophe of August 10, to which he submitted, because he had not the courage to overcome the danger; his arrest in the national assembly, to which he had fled for refuge; finally, his trial before the convention, where he replied to the charges with dignity and presence of mind;—these were the most important events in the history of the king. (See FRANCE.) He exhibited under these circumstances a courage and a strength of mind before unknown in him. As a prisoner of the municipality of Paris, in the Temple, he was denied, till shortly before his death, pen, ink, and paper. His usual employment was instructing his son and reading. January 16, 1793, he was declared guilty of a conspiracy against the freedom of the nation, and of an attack on the general security, by a vote of 690 out of 719; on the 17th January he was condemned to death, by a majority of only five in 721. Jan. 21, 1793, he was guillotined in front of his former palace, in his thirty-ninth year, the appeal to the nation, proposed by his advocates, Malesherbes, Tronchet, and Desèze, having been rejected on the 19th by 380 votes out of 690. His last words were drowned in the rolling of drums and in the cry *Vive la république!* The Abbé Edgeworth, the priest who prepared him for death, cheered him ere the guillotine fell with the words: 'Son of St. Louis, ascend to heaven!'

LOUIS XVII., second son of Louis XVI. and of Marie Antoinette, was born at Versailles, March 27, 1785. He received the title of Duke of Normandy till, in 1789, on the death of his elder brother, he became dauphin. He was four years old when his mother presented him to the seditious populace of Paris and carried him to the capital on the terrible 5th and 6th of October. Confined with his parents and his aunt Elizabeth in the Temple his innocent gaiety and affectionate disposition were the chief solace of the unhappy prisoners. On the death of Louis XVI. he was proclaimed king by the royalists, and his uncle (afterwards Louis XVIII.) assumed the title of regent. He was soon after separated from his mother, sister, and aunt, and delivered (1793) to a shoemaker by the name of Simon, a fierce Jacobin, of a gross and ferocious disposition, who, with his wife, treated the young Capet with the most unfeeling barbarity. Reproaches, blows, scanty food, the damps and filth of a dungeon, and a sleep broken by menaces and abuse, were his hard lot. He was even compelled to drink strong liquors and join in the obscene songs and repeat the atrocious language of his tormentor. He survived this treatment only till June 8, 1795, when he died at the age of ten years and two months. A report spread that he had been poisoned, but an examination of the body by a commission of physicians proved that it was unfounded. After his father's death the royalists styled him Louis XVII. Several impostors appeared pretending to be the prince; among them Hervagant, a tailor's son, in 1802 (died 1812 in prison), and Bruneau, a shoemaker, who in 1818 was condemned to seven years' imprisonment.

LOUIS XVIII. (*Stanislas Xavier*), formerly Count of Provence, third son of the dauphin (the son of Louis XV.), born November 17, 1755, married May 14, 1771, the daughter of King Victor Amadeus III. of Sardinia, Mary Josephine Louisa, who died in 1810. At the accession of his brother Louis XVI. in 1774 he received the title of Monsieur, and after his death that of Regent of France. After the death of his nephew June 8, 1795, he took the name of Louis XVIII., king of France and of Navarre. During the reign of his brother he took but little interest in the intrigues and the pleasures of the court, and had principally occupied himself with books. In the first assembly of the notables in 1787 he appeared on the side of the opposition against Calonne. The people therefore looked upon him with favour. At the second assembly of the notables November 9, 1788, he alone declared himself for the double representation of the third estate. When the violence of the factions in Paris induced the king, June 21, 1791, to attempt to escape to the frontiers of the kingdom, Louis took the road to Montmédy, and the Count of Provence that of Mons. The former was arrested at Varennes, the latter reached Brussels in safety. From Coblentz he protested against the decrees of the National Assembly and the restraints put upon the freedom of the king. With his brother the Count d'Artois at the head of 6000 cavalry he now joined the Prussian army. After the death of Louis XVI. Monsieur proclaimed his nephew King of France as Louis XVII., and in 1795 he was himself proclaimed by the emigrants King of France and of Navarre. The calamities

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which afterwards befell him he bore with dignity and resolution. For many years he led a wandering life, supported by foreign courts and by some friends of the house of Bourbon. He at last took refuge in England in 1807, and having purchased a residence at Hartwell, in Buckinghamshire, he lived there till the fall of Napoleon opened the way for him to the French throne. He entered Paris on the 3d of May, 1814, and on the 4th of June a charter, drawn up with the assistance of his ministers, was laid before the senate and the legislative body, was accepted unanimously, and became the fundamental law of the kingdom. The reappearance of Napoleon in France, March 1, 1815, compelled Louis to flee from Paris in the night of March 20. When the allies invaded France Louis XVIII. returned and went to Cambray. He here proclaimed a general amnesty, with the exception of traitors, and promised to avoid all the faults he had committed in 1814 from ignorance of the new spirit of the nation. Blücher and Wellington besieged Paris, and on its capitulation, July 3, Louis was again restored to the throne of France. July 7 the Prussians and British entered Paris, and on the afternoon of the 9th Louis followed. The new chamber of deputies, under the excitement of recent events, proved ultra-royalist in principle, so much so that Louis was compelled to dissolve it. The moderate constitutional party gained the ascendency, and a liberal ministry was formed. Louis XVIII. died 16th September, 1824, and as he was without issue his brother Charles X. succeeded to the throne.

LOUIS, St., a city of the United States, state of Missouri, on the right bank of the Mississippi, pleasantly situated on a gentle elevation overlooking the river, 750 miles west of Washington and 1201 miles by the river above New Orleans. It is regularly built, and extends over a great area. Amongst the public buildings are the city-hall, the court-house (including the civil courts), the revenue offices, law-library, &c., the Four Courts (including the criminal courts, police headquarters, and a jail), the cathedral, the United States land-office, the custom-house and post-office, the United States arsenal, the masonic temple, centre market buildings, merchants' exchange, the theatre, concert-hall, and the St. Louis and Washington Universities. All these are handsome structures, as are also several of the churches, which are numerous. The public squares and parks cover a total area of 2000 acres. The city is well situated for commerce, having a great command of internal navigation, which affords ready access to a vast extent of country, not only by means of the Mississippi, but also by the Missouri and Illinois, which join that river 18 miles above St. Louis, and the Ohio, which enters 175 miles below it. The railways (of which fourteen trunk lines radiate from St. Louis) have also given it further facilities for commerce, especially since the completion in 1874 of the great bridge over the Mississippi. This structure consists of three arched spans of cast-steel, the middle one 520 feet and the two outer ones each 500 feet in length, resting on stone piers, and connected with the shores by stone piers and arches. Besides two lines of railway and one of tramway it has an ordinary carriage-way and foot-walks. The height of the bridge above high-water mark is 50 feet. The cost of the work was about £2,000,000. Among the chief articles of trade are cotton, cereals, bacon, sugar, tobacco, coffee, wool, live cattle, hides, skins, furs, lumber. In respect to the manufacture of flour St. Louis is considered the first city in the Union. The ores of Missouri are despatched from its wharves to the furnaces of every nation, and its meats are sold in the markets of the principal cities of the East Indies. It is the great depot of the fur trade of the west. Manufactures have also made rapid progress, and there are now numerous iron-foundries, machinery and engine works, chemical works, flour-mills, oil-mills, distilleries, &c. Extensive coal-fields lying under the very site of the city, and intersecting the bluffs across the river, yield an inexhaustible supply of cheap fuel. St. Louis was founded in 1764 by the French from Canada as a trading port with the Indians, but it long remained an inconsiderable village, in recent times its progress has been very rapid, as evidenced by the increase of its population. Pop. in 1840, 16,469; in 1860, 160,773; in 1880, 350,518. On the opposite side of the river, in the state of Illinois, is East St. Louis, a thriving city of about 10,000 inhabitants.

LOUIS D'OR, a gold coin formerly current in France. It was first struck in consequence of an edict of Louis XIII. dated March 31, 1640. It was 22 carats fine, and originally was worth 10 livres of the period (equal to 21 francs 33 centimes, or 17s. 9½d.). The livre having sunk in value it came to be worth 20 and then 24 livres. In 1716 demi-louis of 12 livres, louis of 24 livres, and doubles-louis of 48 livres were struck. In 1810 the louis d'or was replaced by the napoleon of 20 francs, and when the coin was again struck under the restoration the same value (20 francs) was retained.

LOUISIANA, one of the Southern United States of America, situated between lat. 29° and 32° 50' N.; lon. 89° and 94° W.; bounded north by Arkansas, north-east and east by Mississippi, from which it is partly separated by the river of that name, south-east and south by the Gulf of Mexico, and west by Texas, from which it is separated chiefly by the Sabine; area, 48,720 square miles, of which 1000 consist of landlocked bays, 1700 of lakes, and 540 of river surface. The far greater part of the surface consists of an immense alluvial flat, through which the Mississippi and several of its tributaries, particularly the Red River, pursue a winding course, branching off into numerous arms, and either covering a large portion of the country with permanent lakes and swamps or frequently laying it under water by inundations. This tract has a breadth on the Mississippi ranging from 10 to 50 miles, and along the Red River an average breadth of 10 miles. In the north and north-west the surface becomes undulating, and remains covered with dense natural forests, composed of varieties of oak, hickory, black walnut, sassafras, magnolia, and poplar; but, with the exception of this portion, the elevation above the level of the sea nowhere exceeds 50 feet. The main stream of the Mississippi divides itself a little below the junction of the Red River into numerous branches called lagoons, which intersect the south-western portion of Louisiana in such a manner as to form a number of river-girt islands. The most considerable of these branches is the Atchafalaya, which leaves the main stream a little below the mouth of the Red River and falls into the bay of the same name. In consequence of this subdivision of the main stream its strength is so greatly reduced as not to be able to clear away a large bar at its mouth which is a great hindrance to navigation. The delta of the Mississippi occupies altogether about one-fourth of the surface of the state. It lies only 10 feet above the level of the sea, and many parts of it are subject to frequent inundations. A large part of the banks of the rivers is protected by an embankment called the *Levee*, which, on the right bank, commences at Point Coupée, 172 miles, and on the left bank 60 miles, above New Orleans, and is continued for more than 150 miles. The tract thus defended is of great fertility and is both better cultivated and more densely

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peopled than any other part of the state. Sometimes, in consequence of a crevasse (the local name for a breach in the embankment), great damage is done. Wherever the surface in other parts of the state is dry enough to admit of regular cultivation it is with few exceptions fertile, and raises large crops of cotton, sugar, and rice, which are the staple productions. Of the ordinary cereals a good deal of oats, very little rye, and scarcely any wheat are grown; but Indian-corn, potatoes, hay, and tobacco form important items of agricultural produce. There are no manufactures deserving of notice; but the trade is very extensive. The climate of the state is unhealthy from June to the beginning of October, when the yellow fever (which first visited New Orleans in 1769) makes its appearance almost yearly. July is the wettest month. The winter months have a pleasant climate. The state legislature is composed of a governor, a senate of thirty-six, chosen for four years, and representative assembly of not more than 120 nor less than 90 members, chosen for two years. The political capital is Baton Rouge. Among the works of internal improvement are several railroads, of limited extent, centering in New Orleans from Pontchartrain and several other places in its vicinity; the Mexican Gulf Railroad, and that of New Orleans and Nashville, 80 miles of which are in this state; and the Barataria, Carondelet, Orleans Bank, and Veret Canals. Louisiana was taken possession of by the French governor of Canada in name of the French king (Louis XIV.), after whom it was named in 1679. In 1699 the first settlement was formed, which continued to exist, though in a miserable condition, till in 1717 the colony was ceded to a chartered company, one of the wild and ruinous schemes of the notorious Law. In 1720 it was resumed by the crown; in 1763 it was ceded by France to Spain; in 1800 re-ceded to France; and in 1803 purchased from France by the United States. It formed a constitution, and was admitted into the Union in 1812. The state contains fifty-eight counties, there called parishes. Pop. in 1880, 939,946, 483,655 of whom were coloured, 489 Chinese, and 848 Indians.

LOUISIANA, Code of. Most of the United States, even those which were formerly colonies of France and Spain, have adopted the common law of England as the basis of their jurisprudence. The state of Louisiana, however, has steadily adhered to the civil jurisprudence which it derived from the continent of Europe, though in criminal matters the English jurisprudence has been followed. The custom of Paris, which the colonists brought with them as the law of the new colony, was first reduced to writing in France in 1510, and enlarged and amended in 1580. The deficiencies of the customary law, both in the mother country and the colony, were supplied by reference to the Roman jurisprudence. Louisiana was ceded by France to Spain in 1763, and was taken possession of by this latter power in 1769, when the Spanish law was introduced. The cession of Louisiana to the United States introduced the trial by jury in a modified form, and the writ of *habeas corpus*, which were unknown to the pre-existing laws. In 1806 the legislative council ordered two able jurists to prepare a civil code for the use of the territory, on the groundwork of the civil laws which governed the territory. It was reported in 1808, and adopted, but was not allowed to supersede the previous laws except as far as those laws were inconsistent with its provisions. The Digest of the Civil Code now in Force in the Territory of Orleans, as it was called, though termed a code, is, in fact, little more than a synopsis of the jurisprudence of Spain. It continued in operation till 1825 without any material innovation. A revision of this code was then made, and many articles from the Code Napoléon inserted in it, and this revised code has, in the main, since remained in force, although the jurisprudence of Louisiana has, in many particulars, been assimilated to that of the other states of America.

LOUIS PHILIPPE, King of the French, born at Paris, October 6, 1773, was the eldest son of Duke Louis Philippe Joseph of Orleans, afterwards surnamed Égalité, and of the Princess Louise Marie Adelaide of Penthièvre. In his infancy he held the title of Duke of Valois, and in 1785 that of Duke of Chartres. In 1782 his father intrusted the education of Louis Philippe and his other children to Madame de Genlis. Having entered the national guards in 1790, he became a member of the Jacobin Club. In 1791 he obtained the command of a regiment at Vendome, and proceeded with it to Valenciennes, where he gained public approbation by his prudent conduct. In May, 1792, as maréchal de camp, he commanded a brigade of cavalry in Luckner's army, rose under Kellerman in September to be lieutenant-general, and did good service in the famous cannonade at Valmy. He next joined the army of Dumouriez, and took part in the victory of Jemappes. Some time before he had assumed, like his father, the name of Égalité. In 1793, after the defeat at Neerwinden, where he commanded the centre, his position became very precarious. Dumouriez had formed a scheme for placing him on the constitutional throne, and being included in the order of arrest directed against Dumouriez, in April, 1793, he took refuge within the Austrian territory. After many wanderings he procured the situation of teacher of geography and mathematics in the school of Reichenau, near Coire, where, during eight months, he passed under the name of Chabaud-Latour. Having resolved to sail for America, with that view he proceeded to Hamburg, but from want of means he delayed this design, and made a tour through Denmark, Sweden, and Norway, as far as the North Cape. In 1796 Louis Philippe, now, since his father's death, Duke of Orleans, arrived in America, where, in the following year, he was joined by his two younger brothers. The three princes now travelled in the United States, and at last took ship for England, where they landed in 1800. The brothers lived above seven years at Twickenham, near London. In 1808, both brothers having in the meantime died, the Duke of Orleans visited Sicily, where King Ferdinand I. held his court at Palermo. He formed an attachment to the king's second daughter, the Princess Maria Amelia, whom he married 25th November, 1809. He resided four years at Palermo, without taking any part in the public affairs of Europe. After the news of Napoleon's downfall he set out for Paris, where he was received by Louis XVIII., not without distrust, and in 1814 appointed colonel of hussars. On the news of Napoleon's return he set out for Lyons to assist the operations of the Count d'Artois. After an unsuccessful attempt to hold the northern departments for the Bourbons, he left Lille and set out for England to join his family, who had preceded him. He returned in July, 1815, and obtained the removal of the sequestration of his domains which had been imposed by the imperial government. The estrangement of Louis XVIII. from him was, however, increased, and he withdrew in October, 1815, to England, but returned to Paris in the following year. Though the tendencies of the times could not have escaped his sagacity, he cannot be charged with having implicated himself in political intrigues against the older Bourbons. After the coronation of Charles X. his relation to the court became more friendly. During the bloody days of 27th, 28th, and

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29th July, the court had entirely forgotten him. Nor during the struggle was his name mentioned in Paris. On the 29th the provisional chamber, on Laffitte's suggestion, resolved to offer him the regency as lieutenant-general of the kingdom. In a sitting of the chamber on 9th August he swore to the reformed charter, and ascended the throne as King of the French. While he strove zealously to maintain peace abroad, he sought to support himself on the middle classes, whose representatives in the chamber called him to the throne, and to keep down and weaken other parties by the policy of the so-called *juste-milieu*. Being hated by the extreme democrats, frequent attempts were made on his life; but during this period France made vast progress in industry and wealth, and the durability of the July throne seemed to be thereby consolidated. But his selfish policy in the matter of the Spanish marriage had estranged the European courts, and a loud demand for a change in the electoral system being foolishly opposed by the king and the Guizot ministry, his position in France became extremely precarious. The course of his foreign policy in Italy, and in the Swiss disturbances in 1847, only strengthened the call of all parties for a thorough electoral reform, and led, on the denunciation of it by the king in opening the chamber, to demonstrations in the form of reform banquets, which the government sought to suppress by force. The democratic-socialist party at last, on 22d February, 1848, commenced an insurrection in the streets of Paris. About mid-day of 23d February Guizot gave in his resignation; but the insurrection gained in extent and intensity, and neither the command given to the troops on the morning of the 24th to stop firing, nor the abdication of the king a few hours after in favour of his grandson, the Count of Paris, sufficed to lay the storm. Louis Philippe, completely disheartened, unsupported by any administration, and forsaken even by the courtiers, about midnight of the 24th February quitted the Tuileries with his family, and fled from Paris. He went by St. Cloud to Dreux, where he passed the night, and then wended his way to the coast of Normandy, where, with his queen, he concealed himself, amidst many dangers, for several days. At last a steamer, sent by the British government, received them on board, and on 3d March landed them at Newhaven on the English coast. Louis Philippe took up his residence at Claremont, near Windsor, where he died 26th August, 1850.

LOUISVILLE, a town in the United States, Kentucky, capital of the county of Jefferson, 337 miles south-west of Pittsburg, and 82 miles south-west of Cincinnati. The prosperity of the town is in a great measure due to its situation, just above the falls, or more properly, rapids of the Ohio, as this circumstance necessitated the transhipment of much of the goods coming both from above and from below the rapids, and thus promoted the development of a large transit trade. This obstacle to navigation is now escaped by means of a canal two and a half miles in length cut round the rapids mostly through solid rock. In addition to the river traffic, a large railway traffic also has its centre in Louisville, which is connected with the railway system of the Southern States, and also by means of a great railway bridge across the Ohio with all the railways north of that river. Louisville occupies an extensive flat about 75 feet above low-water mark. The streets occupied as private dwellings are for the most part lined with shady trees. The principal public buildings are a fine court-house, the city-hall, the public library, the jail, a custom-house, and four spacious market-houses, besides churches, asylums, and literary and scientific institutions. The manufactures comprehend a great variety of articles, among which, as the most important, it will be sufficient to enumerate tobacco and cigars, machinery, lumber, stove and hollow ware, leather, and leather articles, as saddlery, harness, and trunks, ropes and cordage, soap and candles, marble slabs and ashlar, agricultural implements, cotton and woollen cloth, brass and iron castings, pianofortes, beer, flour, &c. The commerce, of which the estimated annual value exceeds £20,000,000, comprises among the exports every species of western produce and manufacture, and more especially tobacco, besides pork and other products of the hog, for the preparation of which there are several pork-packing establishments. Louisville is the centre for the tobacco growing districts of the west. Formerly the tobacco came principally from Kentucky, but now it is sent in constantly increasing quantities also from Illinois and Indiana. The tobacco is sold by auction by speculators, brokers, and exporters. The farmer receives on the day of sale ready money for his produce, but is not required to agree to the sale if the price seems to him too low. Louisville which was founded in 1780, received its name in honour of Louis XVI., who was then aiding the Americans in their struggle for independence. For nearly twenty years it was almost proverbial for unhealthiness, but a different opinion now prevails, and American writers speak of it as now 'perhaps the healthiest city of its size in the world.' Pop. in 1840, 21,210; in 1860, 68,033; in 1870, 100,753, and in 1880, 123,758.

LOULE, a town of Portugal, in the province and 9 miles N.N.W. of Algarve. It has a pleasant situation on a hill covered with groves of cork-trees and pomegranates. The ruins of a Moorish castle form the most conspicuous feature of the scene. Pop. 14,448.

LOUSE (*Pediculus*). These insects form typical examples of the Anoplura, an order of lower insects, distinguished by the absence of wings (*Aptera*); by the flattened body; by the five-jointed antennæ; by the two simple eyes or ocelli, or by the absence of eyes; by the mouth being fitted for piercing and suctorial purposes; and by the terminal claws or hooks with which the legs are provided. The lice in their development do not undergo any metamorphosis: the young coming from the egg, in the image of the parent, and differing from it only in size. The thorax and abdomen are closely amalgamated, a structure rendering their separation and distinction difficult, and the whole body consists of about twelve segments. These insects are parasitic upon man, and upon most other mammals, and more than one distinct species may be found on an individual. They multiply with great rapidity; a few hours sufficing to produce a new generation. The human race appears to be infested by three, if not by four distinct species. The three common species are the *Pediculus humanus*, occurring over the body generally; the *P. capitis*, found in the head; and the *P. pubis*, infesting the hair of the pubes. The fourth species—*Pediculus tabescentium*—more rarely occurs, and accompanies or causes a form of wasting disease. Most probably the presence of large quantities of these forms during disease, is simply to be viewed as a concomitant phase of the disease, and not as its *cause*, in any sense of the term. Their presence, even in the most cleanly, after fevers, &c., is due simply to the exhausted state of the patient; and to causes connected with the state of the blood and skin, which render the presence and growth of lice possible. The minute eggs of these forms may be caught by the slightest contact, or be conveyed germ-like by the air; and in particular states of the skin or body, a suitable *nidus* may thus be formed for their growth and development. The ancients be-

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lieved in death being actually caused by the presence of large quantities of lice, and they gave to the presumed disease the name of *Phthiriasis* (Greek *phtheir*, a louse). That the belief in its fatal effects is erroneous cannot be doubted, the circumstances as above stated affording the true explanation of such cases. There appears, however, to exist among certain members of the human race, and even among its most highly civilized communities, a certain *diathesis* or state of body in which the presence of lice seems chronic and unavoidable. The *phthiriasis* of the ancients, or lousy disease, apart from its alleged fatal results, has an undoubted existence; and the chronicles of medical science bear evidence to this assertion; the treatment of such cases being found in some instances almost hopeless. The individual so afflicted appears insusceptible of cure; these insects re-appearing on the body after scrupulous and repeated cleansings with simple and also with medicated washes. In ordinary cases, cleanliness of body and clothes is at once the best preventive and cure. Sulphur and mercury—the latter mildly applied in the form of ointment—are the remedies most in vogue. Of old, Herod, Antiochus, Callisthenes, Sylla, and others, are said to have perished from the inroads of lice; but other and more powerful parasites, denominated by this name, are more likely to have proved fatal in these cases.

LOUTH, a municipal borough of England, in Lincolnshire, in the fertile valley of the Lud, at the east extremity of the Wolds, 27 miles E.N.E. Lincoln. It has a station on the East Lincolnshire Railway, and is connected with Lincoln and Mablethorpe by branch lines. The principal public buildings are a handsome town-hall and a fine corn-exchange. It has three established churches, one of which is a fine old structure, with an elegant spire about 300 feet high. There are also eight places of worship belonging to various Dissenting bodies, a grammar and various other schools, a mechanics' institute, a savings'-bank, an hospital and dispensary, and several other charities. Carpets, soap and candles, agricultural implements, and oil-cake are manufactured, and there are large malt-kilns. A canal, communicating with the Humber, enables a considerable trade to be carried on to London, Hull, &c., in corn and wool, and oil-cake. Pop. (1881), 10,691.

LOUTH, a small maritime county in Ireland, in the province of Leinster, bounded north by Armagh and Down, east by the Irish Sea, south by Meath, and west by Meath and Monaghan; length, 28 miles; breadth, 18 miles; comprising 204,123 acres, of which 170,576 acres are under tillage or in pasture. In its coast-line a spacious indentation occurs called Dundalk Bay. On the north it is rugged and mountainous, but in all other parts level or undulating. The subsoil is clay-slate and graywacke, and in a few districts mountain limestone. The soil is generally fertile, excepting on the elevated tracts. The crops are wheat, oats, barley, bere, rye, potatoes, pease, beans, and turnips. Many of the farms are very small, but they are generally well fenced and drained. The total extent of land under crops in 1883 was 93,240 acres, of which 22,913 were under grasses and clover, 27,991 under oats, 14,631 under barley, bere, and rye, 11,431 under potatoes, and 10,253 under turnips. The total number of cattle in the same year was 38,878, of agricultural horses 7068, of sheep 33,006, of pigs 15,169, and of goats 4837. Linen is manufactured, and there is also some cotton-spinning done. The fisheries are important. The number of persons who emigrated from this county between May 1, 1851, and Mar. 31, 1881, was 32,961. Louth contains six baronies and sixty-four parishes, and returns four members to Parliament—two for the county, and one each for the boroughs of Drogheda and Dundalk, which are the principal towns. Pop. (1841), 111,979; (1881), 78,314.

LOUTHERBOURG, or more correctly LUTHERBURG, PHILIP JAMES, a landscape-painter of eminence, born at Strasburg in 1740. He studied under Tischbein, and afterwards under Casanova, and displayed great talents in the delineation of battles, hunting-pieces, &c. After having been admitted a member of the Academy of Painting at Paris, where he first settled, he removed in 1771 to London, where he was employed in the decorations of the opera-house, and also at Drury Lane Theatre. He subsequently contrived an exhibition, called the *Eidophusikon*, somewhat on the plan of the *Diorama*, which however did not prove a very profitable speculation. In 1782 he was made a Royal Academician; and as a landscape-painter he possessed deserved celebrity. He also painted some historical pictures, as the Victory of Lord Howe, and the Siege of Valenciennes. His etchings are also much esteemed. His character was eccentric, and he was so far infatuated with the reveries of animal magnetism as to have accompanied the impostor Cagliostro to Switzerland. He returned to England, and died near London in 1812.

LOUVAIN (Flemish, *Leuven;* German, *Löwen*), a town of Belgium, in the province of Brabant, on the Dyle, 15 miles east by north of Brussels. It is surrounded by a dry, deep fosse, and an earthen rampart from 80 to 100 feet high. It forms almost a perfect circle; diameter nearly 2 miles. The circumference is now too large for the population, and the town contains gardens and cultivated fields. Though the streets are regular the houses are indifferently built, and the whole town has a dull melancholy look. Many of the public buildings, however, are deserving of notice. Of these the principal are the Hôtel de Ville, one of the richest and most beautiful Gothic buildings in the world, elaborately and exquisitely decorated in every part of its exterior by sculptures of subjects taken, for the most part, from the Old Testament; the collegiate church of St. Peter, almost opposite the Hôtel de Ville, built at the end of the fourteenth century, an edifice of vast extent, and rich in works of art, particularly a fine Holy Family by Matsys; the churches of St. Gertrude, St. James', St. Quintin, and Notre Dame, all elegant and noble structures; the Pope's college, and the Salle de Frascati. Louvain possesses courts of first resort and of commerce; a university, formerly of European reputation, now monopolized by the Belgian priesthood under the name of *Université Catholique;* a college, academy of fine arts, botanical garden, anatomical hall, cabinet of natural philosophy, chemistry, and natural history; a collection of pictures, several of them first-rate; several hospitals and benevolent institutions. Some woollens are still made, and also lace and numerous minor manufactures. One of the most important branches of industry is the tanning and working of leather. But by far the most important manufacture at present is beer, of which above 200,000 casks are annually made. For a general trade the town is well situated, having ample communication both by railway and the canal of its name. The name of Louvain first appears in history about the end of the ninth century. It was surrounded with walls in 1115, but was afterwards much enlarged. The dukes of Brabant inhabited the castle till the thirteenth century. The town began to have burgomasters in 1219. At the beginning of the fourteenth century Louvain was the capital of Brabant, contained 200,000 inhabitants, and had an extensive and flourishing trade in the manufacture of broadcloth and all kinds of woollens. But the populace, jealous of the privileges of the nobles, revolted

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in 1382, and being overcome by Duke Wenceslaus and subjected to severe oppression, emigrated in great numbers to England, and thus caused the decay of the town. Pop. 35,893.

LOUVEL, PIERRE LOUIS, the assassin of the Duke of Berry, was born at Versailles in 1783, and served as saddler in the royal stables. February 13th, 1820, about eleven o'clock in the evening, when the prince was conducting his wife from the opera to the carriage, Louvel pressed towards him, seized him by the left shoulder, and stabbed him with a knife in his right side. At the first cry of the prince the soldiers of the guards pursued the murderer, who was apprehended. He was examined in the presence of the minister Decazes, and avowed that six years previous he had formed the resolution of delivering France from the Bourbons, whom he considered the worst enemies of the country; that after the Duke of Berry he had intended to murder the rest, and, finally, the king. His trial was conducted by the chamber of peers. The investigations continued three months, and 1200 witnesses were examined in order to discover accomplices; but the attorney-general declared in the indictment that none had been discovered. He was executed 7th June, 1820.

LOUVIERS (ancient *Lupariæ*), a town in France, in the department of Eure, 17 miles south of Rouen. It consists of an old town, built almost entirely of wood, on the left, and a new town of brick or stone on the right bank of the Eure. The communication between them is maintained by three bridges. The principal edifice is an interesting church, supposed to date from the first crusade. The staple manufacture is broadcloth, which employs from 7000 to 8000 persons in and around the town, and furnishes a large export, chiefly to Piedmont and Italy. The other industrial establishments are worsted mills, an extensive wool-card factory, a machine factory, tanneries, bleachfields, and dyeworks. There is also a considerable trade in corn, wood, charcoal, wool, and flax. Pop. (1881), 10,753.

LOUVOIS, FRANÇOIS MICHEL LETELLIER, MARQUIS OF, minister of war to Louis XIV., son of the Chancellor Letellier, born at Paris 18th January, 1641, was early made a royal councillor through the influence of his father. He displayed so little inclination for business and so great a love of pleasure, that his father threatened to deprive him of the reversion of the secretaryship in the war department, which had been conferred on him at the early age of thirteen. From this moment young Louvois abandoned his habits of dissipation, and devoted himself to business. After 1666 he had the whole management of the ministry of war, and soon exercised a despotic control over his master and over the army. His extensive knowledge, his decision, activity, industry, and talents, rendered him an able minister; but he cannot aspire to the praise of a great statesman. He was too lavish of the blood and treasure of France, too much of a despot, to deserve that honourable appellation. His reforms in the organization of the army; his manner of conducting the wars of his ambitious master, if they were not rather his own; and above all, his successes, render his administration brilliant; but, justly appreciated, Louvois must be considered as the evil genius of the showy but disastrous reign of Louis XIV. While the king was flattered with the idea of having formed the young minister, and of directing his government in person, everything was, in fact, done by Louvois, and according to his views. The generals were all required to communicate immediately with him; and although Turenne would not submit to this order, yet the king showed all his letters to his minister, and answered them according to his suggestions. Bold and grasping schemes, which could be executed only by the unwearied activity and industry of Louvois, were proposed by him for the purpose of rendering himself necessary to Louis, who, he was conscious, disliked him personally. Hence, notwithstanding the solemn renunciations of all claims to Franche-Comté and the Spanish Netherlands, war was undertaken in 1667 and 1669 to get possession of them. The war of 1672 against Holland was begun at the instigation of Louvois, and would have been finished much sooner had he not, contrary to the wishes of Condé and Turenne, insisted upon occupying the fortresses, and thus given the Dutch time to open their sluices. The victories of Turenne in 1674 and 1675 were gained by a disobedience of the orders of the minister of war; but the desolation of the Palatinate was commanded by him. On the death of Colbert (1683), of whom he had been the enemy, his influence became still greater, and one of its most fatal effects was the revocation of the edict of Nantes (1685), the *dragonnades*, and the consequent flight of so many peaceful and industrious Calvinists. The encroachments of France had united the European powers in the League of Augsburg. Louvois would have the king commence operations against the allies at once, but the growing influence of Mme. De Maintenon was sufficient to prevent this. In 1688, however, the French forces took Philipsburg on the Rhine; and on the order of Louvois, the Palatinate was reduced to a wilderness in mid-winter (1689). The war was conducted with great ability by Louvois; but his arrogance had long rendered him odious to Louis, and his death, on 16th July, 1691, was regarded as a relief by his master. Louvois' organization of the army lasted till the Empire; but he also undid the work of Colbert, and destroyed the commerce of France. There is an excellent history of the administration of Louvois, compiled, with the aid of official manuscripts, by Camille Rousset, keeper of the archives of the French ministry of war, in four vols. 8vo (third edition, Paris, 1864).

LOUVRE, the old royal palace at Paris, on the north bank of the Seine, a splendid quadrangular edifice, with a court in the centre, completed by Napoleon. The origin of its name, and the time of the erection of the oldest part of it, are unknown. We only know that Philip Augustus, in 1214, built a fort and a state prison in this place; that Charles V., during the years 1364–80, added some embellishments to the building, and brought his library and his treasury thither. Francis I. erected that part of the palace which is now called the *old Louvre*. Henry IV. laid the foundation of the splendid gallery which connects the Louvre on the south side with the Tuileries; Louis XIII. erected the centre; and Louis XIV., according to the plan of the physician Perrault, the elegant façade towards the east, together with the colonnade of the Louvre, which, even now, is the most perfect work of architecture in France. At a later period Louis XIV. chose the palace built by him at Versailles for his residence. After Napoleon had taken possession of the Tuileries he began a second gallery, opposite to the former, by which the two palaces would have been made to form a great whole, with a large quadrangular court in the centre: only 600 feet of it were completed at the time of his abdication, and it remained uncompleted till 1855, when the work, in an improved and extended form, was finished. It was greatly injured by the communists in May 1871, the Richelieu pavilion, containing the magnificent library, being burned. The Louvre was set apart by the Convention as a museum for the national collections in science and art. It contains the museums of paintings, drawings, engravings, bronze antiques, sculptures, ancient and modern,

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together with special collections of antiquities, and an ethnographical collection.

LOVAT, Lord (Simon Frazer, twelfth Baron Frazer of Lovat), a prominent actor in the rebellion of 1745, was the second son of Thomas Frazer of Beaufort, third son of the eighth Lord Lovat. He was born in 1667. He was educated at King's College, Aberdeen, and in 1694 accepted a commission in the regiment of Lord Murray. In 1699, on the death of his father, he assumed the title of Lord Lovat, to which on the death of the tenth Lord Lovat his father had acquired a disputed claim. In consequence of proceedings taken in 1698 against him and his clan, in which he was declared guilty of treason, he went to France, and paid his court to the exiled king at St. Germains. He afterwards procured an interview with King William, and having obtained a pardon returned to Scotland. Being summoned before the High Court of Justiciary, 17th February, 1701, for an outrage done to the Dowager Lady Lovat, whom he had married by violence, he failed to appear, and was outlawed. In 1702, after coming to an understanding with the Jacobite chiefs, he visited France, and in 1703 returned to Scotland with the title of colonel in the Pretender's service; but finding no encouragement he himself betrayed the plot to the Duke of Queensberry, then at the head of the Scottish government. He subsequently returned to France to act as a government spy on the exiled court. Here he was arrested and sent first to the Bastille, and afterwards confined for three years in the castle of Angoulême and seven in the city of Saumur. At length he effected his escape, and landed at Dover 15th November, 1714. He remained in hiding in London till the following June, when he was arrested at the instigation of his personal enemy the Earl of Athol. Forbes of Culloden and other friends of the government having become bail for him to the extent of £5000 he was set at liberty. He returned to Scotland, where he was still under sentence of outlawry, and after escaping arrest by order of the lord justice-clerk, and submersion by the rebels, who fired upon a boat which carried him along with John Forbes, he succeeded in concert with the Forbeses in rescuing Inverness from the rebels, and rendering other services to the royal cause. He received in reward the estate and title of Lovat, the other claimant of which had been involved in the rebellion. His title, which had been objected to in various elections, was decided in his favour by the Court of Session in 1730. In 1740 he was the first to sign the association for the support of the Pretender, who promised to create him a duke and give him the title of lieutenant-general and the military government of the Highlands. On the breaking-out of the rebellion, in 1745, he sent his eldest son with a body of his clan against his own inclination to join the Pretender. Lovat, who remained at home, had an interview with the Pretender after his defeat at Culloden, and reproached him fiercely for his intention of abandoning the contest, reminding him of the example of Bruce. He was apprehended and found guilty of treason, and the sentence was executed on the Tower Hill, 9th April, 1747, in the eightieth year of his age.

LOVE-BIRD (*Agapornis*). These birds belong to the family Psittacidæ, or Parrot family. They are inhabitants of the Australian province, and are noted for the exceeding brilliancy of their plumage. In structural characters, conformation, and habits they generally resemble the parrots, although they are of smaller size, and do not present the same talents for talking and the same intelligence as the more typical members of the family. They are common cage-birds in this country.

LOVE-FEAST. See Agape.

LOVELACE, Richard, a poet of the seventeenth century, was born about 1618, and educated at Oxford. On leaving Oxford he repaired to court, entered the army, and became a captain. He expended the whole of his estate in the support of the royal cause, and after entering into the French service, in 1648, returned to England, and was imprisoned until the king's death, when he was set at liberty. His condition was at this time very destitute, and strongly contrasted with Anthony Wood's gay description of his handsome person and splendid appearance in the outset of life. He died in great poverty in an obscure alley in 1658. His poems, which are light and elegant, but occasionally involved and fantastic, were published in 1659 under the title of Lucasta, under which name he complimented Miss Lucy Sacheverell, a young lady to whom he was attached, who on a false report of his death married another person. Colonel Lovelace, who for spirit and gallantry has been compared to Sir Philip Sidney, also wrote two plays, the Scholar, a comedy, and the Soldier, a tragedy.

LOVER, Samuel, a versatile Irish genius, who combined the functions of painter, novelist, poet, and musical composer, was born in Dublin in 1797. He first devoted his attention to painting, and in 1828 became a member of the Royal Hibernian Academy of Art. He afterwards turned his attention to literature, and wrote novels, which he illustrated with his own pencil, dramas, operettas, and songs, which he set to music. In 1844 he gave a series of public entertainments called Irish evenings, which he repeated in America in 1846. He died in 1868. Among his works are Legends and Stories of Ireland (1832–34); Rory O'More (1837); Songs and Ballads (1839); Handy Andy (1842); Treasure Trove (1844). The Angels' Whisper, Molly Bawn, and the Low-backed Car are among his most popular songs.

LOVE-SEAL, one of the types of seals frequently used in the middle ages, which bore an amorous motto or an amorous design, as of two persons kissing. The quatre-foil or four-leaved flower is used on these seals as an emblem of love. The designs and legends used on them are numerous.

LOW COUNTRIES. See Netherlands.

LOWE, Sir Hudson, lieutenant-general in the British army, was born at Galway, 28th July, 1769. He entered the army at an early age, and served with credit in various campaigns in Italy and Germany, in Corsica in 1793, and Egypt, 1800–1. He was governor of Capri from 1804 to 1808, when he surrendered it to the French. In 1810 he was governor of Cephalonia and Ithacea. In 1813 he was attached to the army of Blücher, and took part in the invasion of France in the early part of the following year. This year he received the rank of major-general and the title of K.B. He was appointed in 1815 to the command of the English troops which were to co-operate with the Austro-Sardinian army in Italy; and on the fall of Napoleon he was appointed governor of St. Helena, and intrusted with the care of the ex-emperor. The same year he received the rank of lieutenant-general and the title of C.B. He embarked for St. Helena in January, 1816, and returned to England in July, 1821. In 1825 he was appointed military commander in Ceylon, but soon after returned to answer the charges brought against him. He died 10th January, 1844. Sir Hudson Lowe has been bitterly accused by the partisans of Napoleon for want of courtesy and for rigour and cruelty to his prisoner. It is, however, freely admitted that Napoleon and his suite made a system of exaggerating their grievances, and even sedulously tried to provoke them, with a view to

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exciting sympathy in Europe. Many of the grievances were puerile, as that Sir Hudson would not give Napoleon the title of emperor, which England had never recognized, and which he was forbidden by his government to use. Sir Hudson besides was really alarmed at the danger of another escape, and deemed the utmost vigilance necessary to the performance of his duty, and in this there is every reason to believe he was right. The letters and journals of Sir Hudson Lowe, with an account of Napoleon's captivity at St. Helena, were published by William Forsyth Harris in 1852.

LOWELL, a city of the United States, in Massachusetts, on the right bank of the Merrimack, 25 miles N.N.W. from Boston, neatly and substantially built of brick, chiefly remarkable for its manufactures. It has numerous places of worship, public free schools, and grammar-schools, one of which occupies a very handsome building; a lyceum, the Lowell Institute, and the Mechanics' Association; a library, an hospital, and banks. The goods manufactured are sheetings, flannels, drillings, prints, shirtings, negro-cloth, carpets, rugs, broadcloths, water-proof woollens, and cassimeres. There are about one hundred and fifty cotton, calico, and muslin-de-laine, woollen, and carpet-mills, besides other branches of textile manufacture. There are also extensive bleacheries, large machine shops, paper and chemical works, &c. The water-power here is very great and easily available, being supplied by the Merrimack, which here falls 33 feet. There is a railway from Lowell to Boston, and several branch lines. Pop. in 1880, 59,475.

LOWER EMPIRE (*Bas Empire*), a term sometimes applied to the Roman Empire during the period of its decline, dating from the removal of the seat of empire to Constantinople. After the division of the Empire into East and West the term applies to both divisions.

LOWESTOFT, a seaport town and watering-place of England in the county of Suffolk, on a cliff commanding an extensive view of the German Ocean, occupying the most easterly point of the kingdom. It consists of a principal and several minor streets, the former nearly one mile long, well-paved, and clean. The declivity of the cliff is covered with hanging gardens and trees, and between it and the sea is a row of buildings used for curing fish, and a group of fishers' cottages. The principal public buildings are the parish church, a handsome structure with a tower and a spire; three other churches; and chapels belonging to various Dissenting bodies; a town-hall; public hall; masonic hall; mission-rooms; and subscription reading-room and library. There are some good banks and hotels, and a well-laid-out public park. The chief charitable institutions are an infirmary and fishermen's almshouses. There are manufactures of ropes, sails, nets, and oil-cake; and ship-building and brewing are carried on. The trade received a great impetus from the formation of a fine harbour, and the extension to it of the Great Eastern Railway. The harbour, which (now belonging to the Railway Company) was purchased by Sir Morton Peto in 1844, and reconstructed by him, consists of two piers 1300 feet long, the southern of which, with the adjoining esplanade, forms a favourite promenade. In 1882 628 vessels of 92,885 tons, entered the harbour, and 588 of 88,135 tons, cleared. About 80 boats, employing about 800 men, are occupied in the herring and mackerel fisheries. New docks and a spacious market are being constructed for the landing and selling of fish. The new town of South Lowestoft has sprung up near the harbour and railway, and the town has also extended itself in other directions. Pop. in 1881, 19,597.

LOW-PRESSURE ENGINE, a steam-engine in which the pressure on the piston is never much more than two atmospheres. The labours of Thomson, Rankine, and others in thermodynamics have shown that the use of high-pressure steam, steam-jackets, and condensation, is necessary for economy. Until a short time ago all condensing engines were low-pressure, now the most efficient engines constructed are certain marine engines (designed for vessels which make long voyages) which are high-pressure and condensing.

LOWTH, ROBERT, Bishop of London, a distinguished English prelate, was born in 1710. He received his education at Winchester school, whence he was elected in 1730 to New College, Oxford, of which he was chosen a fellow in 1734, and in 1741 was elected professor of poetry in the university. In 1753 he published his De Sacra Poesi Hebræorum Prælectiones Academicæ (4to), which has been translated into English, French, and German. The best edition is that of Oxford, 1821, with notes by Michaelis, Rosenmüller, &c. There is an English translation by Gregory, with the principal notes of Michaelis, &c., published in 1787, of which a sixth edition was published in 1853. In 1754 he received the degree of D.D. from the University of Oxford by diploma, and in 1755 went to Ireland as chaplain to the Marquis of Hartington, appointed lord-lieutenant, who nominated him Bishop of Limerick, which preferment he exchanged for a prebend of Durham and the rectory of Sedgefield. In 1758 was published his Life of William of Wykeham (8vo), which in 1762 was followed by a Short Introduction to the English Grammar. In 1756 a misunderstanding took place between Lowth and Warburton, the latter of whom took offence at certain passages in the Prælectiones concerning the Book of Job, which he believed to be aimed at the theory of his Divine Legation of Moses. Warburton, in an Appendix concerning the Book of Job added to the second edition of his Divine Legation, indulged in the acrimony for which he was distinguished, and thereby produced a reply from Dr. Lowth, in a letter to the Right Reverend the Author of the Divine Legation of Moses, which has become memorable at once for the ability and the severity of its criticism. The ultimate silence of the Warburtonians gave the victory to their antagonists. In 1766 Dr. Lowth was appointed Bishop of St. David's, whence in a few months afterwards he was translated to the see of Oxford. In 1777 he succeeded to the diocese of London, and the next year published the last of his literary labours—Isaiah, a New Translation, with a preliminary dissertation and notes. Rosenmüller says he understands and expresses the Hebrew poet better than any other writer. On the death of Archbishop Cornwallis the primacy was offered to Dr. Lowth, but he declined that dignity in consequence of his age and family afflictions. He died November 3, 1787, aged seventy-seven.

LOXODROMIC CURVE, the path of a ship when her course is directed constantly to the same point of the compass, thereby cutting all the meridians at the same angle. See RHUMB LINE.

LOYOLA, IGNATIUS (*Inigo Lopez de Recalde*), the founder of the order of the Jesuits, was descended of a noble Biscayan family, and was born at the castle of Loyola, Guipuscoa, in 1491. He seems to have been from the first of an enthusiastic temperament, which was fomented by the Spanish romances, in which religion and chivalry are blended, and he is said in early youth to have himself written a romance of which the apostle Peter was the hero. In 1505 he became attached as a page to the household of Ferdinand V. His relative Don Antonio Manriquez, duke of Najara, perceiving his military inclination, had him trained to the profession of arms, in which he distinguished himself by his valour. This was

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indicated in a most chivalrous manner at the siege of Pampeluna, on the occasion of the invasion of Navarre by Francis I. in 1521, when the garrison was induced to hold out by his example alone. This siege proved the turning-point of Loyola's career; he was made prisoner by the French, having been wounded in both legs by a cannon ball in such a manner as to render him lame for life. He was conveyed to the castle of Loyola, where he had twice to undergo a painful operation, followed by a long confinement. The only books he found to relieve its tedium were books of devotion and the lives of saints. This course of reading threw him into a state of spiritual exaltation, which he has minutely described in his Spiritual Exercises, a devotional book written in Spanish, and which has been translated into French and Latin. His ambition now turned from a military life, for which he was incapacitated, to the imitation of the extraordinary acts of self-denial of such saints as St. Dominick and St. Francis; but it was not without severe and protracted mental conflicts that he renounced worldly aspirations in favour of the dreams of spiritual conquest which now filled his imagination. When he had sufficiently recovered he made a pilgrimage to Montserrat in Catalonia, where he hung up his arms before the Virgin and assumed the pilgrim's staff. On his way he encountered a Moor who doubted of the immaculate conception. He debated within himself whether it was his duty to follow and kill him, but left the decision to his mule, which carried him on his way. After dedicating himself to the church at Montserrat he proceeded to the hospital of the Dominican convent of Manresa, where amid the severest penances he devoted himself to the care of the poor and sick. His mind at this time fluctuated between spiritual visions and imaginary revelations on the one hand and temptations to suicide on the other. After ten months spent at Manresa he proceeded on a pilgrimage to Rome and Jerusalem (1523), conducted with his customary austerity. His object at this time was the conversion of the infidels, but being refused a permanent residence at Jerusalem by the primate of the church he returned to Spain and attended from 1524 to 1527 the schools and universities of Barcelona, Alcala, and Salamanca. Having broken in the last town an injunction not to preach till he had studied theology for four years, he was confined in the Inquisition. On his release he went to Paris, where, placing himself in the lowest classes, he went through, from 1528 to 1535, a seven years' course of general and theological training. Here he formed the first nucleus of the society which afterwards became so famous. Under his influence Pierre Le Fèvre, a Savoyard priest, François Xavier, professor of philosophy, Lainez, Salmeron, Bobadilla and Rodriguez of Azevedo, students, met together with Loyola on 15th August, 1534, in a subterranean chapel of the Abbey of Montmartre, took the sacrament administered by Le Fèvre, and bound themselves together by vows of chastity and poverty, devoting themselves to the care of the church and the conversion of infidels. In 1536 he met the members of this body at Venice with a view to the pilgrimage to Jerusalem, but the war which broke out in 1537 between the Venetians and the Turks prevented the accomplishment of this object, and his companions dispersed to preach in the cities of Italy. At Venice Loyola became attached to Cardinal Caraffa (Paul IV.), the founder of the order of the Theatines, but this mild order did not satisfy his ambition, and he proceeded to Rome to procure the recognition of his own order. This recognition was strongly opposed in the college of cardinals, but was granted partially in 1540, and fully three years later. From the name of a church which was given them in Rome the society, which was organized according to the military notions of Loyola, took the name of the Company of Jesus. Besides the vows of poverty and chastity their vow of obedience bound them to perform unhesitatingly all the commands of the pope. They discarded the peculiar garb by which monastic orders were usually distinguished, and devoted themselves to the highest objects to which a religious society could aspire—the education of youth, the defence of the church, and the propagation of the faith. Besides missionary enterprises for the extension of the church, their chief means of influence were the pulpit, the confessional, and their schools and colleges for training the young. Thus the romantic devotion of Loyola took a practical shape. On 22d April, 1541, Loyola was elected general of the order, and drew up its constitution, assisted by the organizing genius of Lainez. He continued to reside in Rome and govern the society he had constituted till his death. In 1542 Loyola assisted Caraffa in reorganizing the Inquisition, which had fallen into decay, founding it on the principle of unreasoning submission embodied in rules of great severity. He died worn out with the fatigues of his ascetic severities on 31st July, 1556. He was beatified in 1607 by Paul V., and canonized in 1622 by Gregory XV. See JESUITS.

LOZÈRE, a department of France, bounded N. by the departments of Haute-Loire and Cantal, E. by Ardèche and Gard, S. by Gard and Aveyron, and W. also by Aveyron; area, 1996 square miles, of which 758 are arable and 663 *landes*. The department is mountainous, and is divided into three distinct regions—the north, consisting of basaltic and granitic rocks, and called Montagnes, yielding rye, a very little barley and oats; the south-west, calcareous, and called Causses, producing in addition wheat and fruit, being the most fertile portion of the department; and the south-east, schistous, called the Cevennes, growing large quantities of chestnuts and potatoes, the mulberry, and on occasional patches the vine, from which an indifferent wine is obtained. The mountain regions support in summer immense flocks of sheep from Languedoc. Four considerable rivers—the Allier, Lot, Tarn, and Gardon de Mialet, a tributary of the Gard—rise within the department, and by the courses which they take indicate its three general slopes, which belong respectively to the basins of the Loire, the Rhone, and the Gironde. The minerals are numerous, including iron, argentiferous lead, copper, and antimony; but none of them seem capable of being worked to much advantage. The quarries are of marble, gypsum, porphyry, granite, &c. Neither manufactures nor trade have made much progress. This department nearly corresponds to the country of the ancient Gabales, and under the Romans formed part of Aquitania Prima and Septimania. The massacres committed in it by Louis XIV., in the attempt to extirpate what he called heresy, have left an indelible stain on his memory. For administrative purposes Lozère is divided into three arrondissements, twenty-four cantons, and 197 communes. The principal towns are Mende, the capital, Florac, and Marvejal, after which the arrondissements are named. Pop. (1881), 143,565.

LÜBECK, or LÜBEK, one of the free towns of Germany, and a constituent of the German Empire, on a low ridge at the confluence of the Wackenitz with the navigable Trave, 38 miles north-east of Hamburg, and 12 miles from the Gulf of Lübeck, a bay of the Baltic. It was formerly surrounded by walls and bastions, which have been levelled down and converted into pleasant walks, and it is still entered by four gates of ancient feudal structure;

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and the whole town, with its numerous gable-ended houses, many of them richly decorated and highly picturesque, furnishes a striking specimen of the quaint architecture of the fifteenth century. It consists of four quarters, and the communication between the opposite sides of the Trave is kept up by means of four bridges. The buildings and objects most deserving of notice are, the Dom or cathedral, a structure of red brick, begun in 1170, but not completed till 1341, surmounted by two spires 416 feet high, and containing a choir-screen regarded as one of the finest specimens of wood-carving in existence; a stone pulpit and brass font, both of admirable workmanship; and a great number of interesting monuments; the Marienkirche (St. Mary's Church), also of red brick, in elegant pointed Gothic, with a beautiful high altar and chancel, both of black marble; the Ægidienkirche (St. Giles' Church), of small dimensions, surmounted by a lofty spire; the Petrikirche (St. Peter's Church), built in 1163, repaired and decorated in 1826; and three other Lutheran churches, a Reformed church, and Roman Catholic chapel; the town or senate house, in ancient Gothic, somewhat defaced by modern repairs, but still a fine turreted structure, containing several noble halls, with fine ceilings and carving, and possessed of considerable historical interest as the place where the deputies of the eighty-five Hanse towns held their sittings; the gymnasium, school of design, normal, navigation, and numerous other schools; the town library, of 50,000 volumes; the deaf and dumb, blind, and lunatic asylums; the orphan and other hospitals; the infirmary, and a great number of well-endowed charitable institutions. The manufactures, once of much importance, but now greatly decayed, consist of woollen and linen fabrics, starch, hats, soap, cards, tobacco, glue, animal charcoal, leather, sail-cloth, vinegar, musical instruments, and articles in gold and silver; there are also numerous breweries and distilleries. The trade, chiefly in grain, timber, colonial produce, and manufactures, still continues to be extensive, though it is subjected to formidable competition, particularly from Kiel. A more serious obstacle to the prosperity of Lübeck is the gradual shallowing of the Baltic, which threatens ultimately to leave it without a harbour. It is connected by railway with Hamburg and Berlin, and the whole European railway system. Steamers in considerable numbers keep up regular communication with all important ports in Russia, Sweden, and Denmark. The total imports of Lübeck by sea and land in 1881 amounted to a total of £9,785,200; the exports were £8,570,500. The total number of vessels entered in 1882 was 2167 of 497,600 tons; cleared 2171, of 500,470 tons. The trade is chiefly with Great Britain and the north of Europe. Lübeck possesses a territory of 127 square miles. This territory, instead of forming one contiguous whole, consists of ten isolated portions, inclosed partly by Holstein, partly by Lauenburg, and partly by Mecklenburg-Schwerin. The constitution of Lübeck was modified in 1875. It has a senate of 14 members, and a council of burgesses of 120 members, with a committee of 30. The senate is the executive, the bürgerschaft the legislative body, the latter having the initiative in all measures relating to finance, foreign treaties, and general legislation. The estimated revenue and expenditure for 1882 were each £140,076. The debt in 1882 was £1,141,331. The town was founded or refounded by Adolphus II., count of Holstein, about 1144. In 1163 it became the seat of a bishopric. In 1202 it was taken by the Danes, whom it expelled in 1226, and placing itself under the protection of the Emperor Frederick II. it became an imperial free city. About thirty years later it became the head of the Hanseatic League. (See HANSA.) About 1530 the bishop embraced the Reformation, and became a secular prince of the empire. Until the Peace of Westphalia (1648) the history of Lübeck is intimately associated with that of the League. After this its prosperity, already seriously injured by the Thirty Years' war, as well as by the rise of the Dutch towns and other rivals in commerce, continued to decline. The territory of Lübeck was incorporated with the French Empire in 1810, and liberated in 1813. Pop. in 1880 of the town, 51,055; territory, 63,571.

LUBLIN, a town, Russian Poland, circle of Lublin, beautifully situated on a height above the left bank of the Bistritza, 94 miles south-east of Warsaw. It is very poorly built, consisting for the most part of wooden houses, and irregular ill-formed streets. Among its edifices are a cathedral and numerous other churches, an elegant town-house, a palace, a Piarist College, a diocesan seminary, a theatre, house of correction, and several hospitals. The manufactures are woollen cloth, and the trade is in cloth, corn, and wine. There are also three important annual fairs, one lasting a month. Pop. 33,000.

LUBRICANT, any substance applied to rubbing surfaces to diminish friction. Lubricants fill the interstices between the particles of the surfaces in contact, and so prevent their interlacement. Tallow is used where the rubbing surfaces are of metal and wood, and even when they are both metal, if they happen to be rough. Oil is more commonly employed for metal surfaces, and it must be of greater fineness, as the surfaces are harder and smoother. Powdered plumbago has been used for highly polished surfaces; it may yet perhaps come into extensive use for lubricating pistons of engines employing highly superheated steam. Water is found to be a good lubricant, in the dead-wood bearing of a screw-propellor shaft, the foot of the upright shaft of a turbine, and at all rubbing surfaces which happen to be under water.

LUCA GIORDANO (also called *Luca Fa Presto*). See GIORDANO.

LUCAN (in full MARCUS ANNÆUS LUCANUS), a Roman poet, born at Corduba, in Spain, about A.D. 38. His father, a Roman knight, was the youngest brother of the philosopher Seneca. Lucan went to Rome when a child, and having obtained celebrity at an early age by his talents, excited the jealousy of Nero, who himself aspired to literary honours, and was forbidden by the tyrant to recite in public. This induced Lucan to join the conspiracy of Piso. The plot was discovered, and Lucan, who was so unnatural as to inform against his own mother as accessory, was condemned to death. He chose the death of his uncle, and had his veins opened. He died in the twenty-seventh year of his age (A.D. 65). Of his poems, only his Pharsalia has come down to us, in which he narrates, in ten books, the events of the civil war between Cæsar and Pompey. The poem is unfinished, and as it appears to have been produced at different times, it is uncertain whether it has been left unfinished by the author or whether the latter part has been lost. In the earlier portions the liberal sentiments of the author are checked by deference to the emperor, in the latter he is inveighed against in unsparing language. The merits of the poem are unequal. It possesses the highest poetical excellencies disfigured by great faults, which are easily explained by the youth of the author, and the fact that it probably did not receive his final revision. The best editions are Oudendorp's (Leyden, 1728, two vols. 4to), Burmann's (Leyden, 1740, 4to), and Weber's, Leipzig (1821–31). Lucan has been translated into English by Rowe and by H. T. Riley.

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LUCAYOS. See BAHAMAS.

LUCCA, a province, formerly a duchy of Italy, bounded N. by Massa e Carrara and Modena, E. by Firenze, S. by Pisa, W. by the Mediterranean; area, 577 square miles. In the north it is covered by the central chain of the Apennines, from which several ramifications stretch south, gradually subsiding, and finally merging into plains as they approach the sea. With exception of the north part of the duchy, which, from the height of its mountains, furnishes chiefly pasture, chestnuts, and timber, the whole surface is adapted for cultivation; the hills for the vine, and more especially the olive; and the lower valleys and plains for all kinds of cereals, and on particular spots for maize. The soil is remarkably fertile, and the culture of it is considered the best in Italy. The mulberry grows almost everywhere; and vast quantities of excellent silk are obtained, spun, and exported. This article, and oil and corn, furnish the chief sources of wealth. There are no manufactures of any consequence. Pop. 301,474.

LUCCA (French, *Lucques*), a town of Italy, Tuscany, capital of the ancient duchy, now of the province of Lucca, in a fertile and well-irrigated plain, near the left bank of the Serchio, 37 miles N.N.W. Florence, with which and with Pisa and Leghorn it is connected by railway. It lies within view of the Apennines, encircled by several of their low ramifications, covered with vineyards and handsome villas, imparting to the town, with its walls flanked with bastions, and its numerous towers and spires, a very striking appearance when viewed from a distance. It is entered by four gates, and is well built, having numerous handsome houses and streets; though not regularly formed, they are spacious, clean, and well paved. It contains numerous antiquities; and one of the spots least attractive in itself, but most interesting to the antiquary, is the fish-market, the large oval of which is the Roman amphitheatre; while the buildings around it, though converted into modern dwellings, are in a great measure composed of the ruins of the amphitheatre, and exhibit huge solid arches, and masses of brick and stone, on their original sites. The principal edifices are the *Duomo* or cathedral, with a magnificent façade, in imitation of that of the cathedral of Pisa, a Romanesque portico, and stained glass of the richest kind; the Church of San Michele, an ancient and imposing structure; the Church of San Frediano, founded in 686, furnishing an interesting specimen of early Christian architecture, and adorned with fine mosaics, frescoes, and paintings; the ducal palace; the Palazzo Borghi, now converted into a poorhouse; and an aqueduct, carried from a distance into the city, over 459 arches. The manufactures consist chiefly of silk goods, woollen cloth, and bonnets; and there are numerous silk-mills. The trade is almost confined to the above articles of manufacture, agricultural produce, and olive-oil, particularly the latter, which bears a high name, and is largely exported. Lucca is the see of an archbishop, and the seat of several important courts and public offices. Pop. (1881), 20,421.

First an Etruscan, then a Ligurian town, Lucca afterwards became a Roman colony. About the end of the sixth century it fell under the power of the Lombards. It subsequently passed under the dominion of Charlemagne, under whom it enjoyed considerable liberty, and was annexed by Otho I. to the German Empire. About 1115 it became the seat of a republic, and in 1173 it furnished considerable assistance to Frederick Barbarossa against Florence. It joined in the Guelph and Ghibelline contests of this period, and carried on a protracted war with Pisa. In 1320 it fell under the dominion of Castruccio Castracani. At his death it became again a republic, but in the following year (1329) it was seized by Louis of Bavaria, and sold by him to the rich Genoese Gherardino Spinola. It now became involved in a net-work of intrigue and violence, was seized by John, king of Bohemia, transferred by sale to various purchasers, the last of whom was Florence, which had to dispute the possession of its purchase with Pisa. The Lucchese called this epoch their Babylonish captivity. At length, in 1369, it repurchased its liberty from the Emperor Charles IV. Sometimes in alliance, and sometimes at war with Florence, it maintained its independence till the French revolution. It was occupied by the French in 1799, and together with Piombino was formed into a principality in 1805, and given by Napoleon to his sister Elise. The Congress of Vienna in 1814 erected it into a duchy, and gave it to the infanta Maria Louisa, duchess of Parma, in exchange for that duchy, which was ceded to the ex-empress Maria Louisa. On the death of the latter in 1847 Parma reverted to the son of the infanta, and Lucca was then ceded to Tuscany as provided by the congress. In 1860 it became part of the Kingdom of Italy.

LUCENA, a city of Spain, in Andalusia, in the province and 30 miles S.S.E. of Cordova. It is well built, and has a highly-decorated parish church, a variety of schools and benevolent institutions, a town-house, two hospitals, an orphan asylum, a magnificent 'paseo' or public walk in one of the principal squares, and in the environs esteemed medicinal baths. Manufactures—linen fabrics, shoes, soap, earthenware, delft, glass, brandy, wine, oil, vinegar; and iron, copper, and other metallic vessels, &c. Pop. 19,540.

LUCERA (Latin, *Luceria*), a town of South Italy in the province of Foggia, lies on a rocky eminence 11 miles W.N.W. of Foggia. It is surrounded by ancient walls, with five gates, and substantially built, though the streets are narrow and ill-paved. The principal edifices are a cathedral, once a mosque, with thirteen pillars of verd antique, supposed to have been taken from a temple of Apollo; a bishop's palace, royal college, extensive court-houses, with residences for the judges, and a public prison. Pop. (1881), 14,832.

LUCERNARIA (Latin, *lucerna*, a lamp), the typical example of the Lucernaridæ, an order of the Hydrozoa. These forms are nearly allied to the Medusidæ or Jelly-fishes (which see), and the most familiar member of the Lucernarida is the *Lucernaria auricula*, a little organism somewhat bell-shaped, and which is frequently found adhering to pieces of floating sea-weed and other objects. The body consists of a single individual form, and not, as in nearly allied species, of a compound mass including several or many individuals. It attaches itself by a short foot-like process, but it can also detach itself at will and swim freely about by contracting and expanding the bell-shaped disc or 'umbrella,' as it is technically called. The edge of the umbrella is provided with eight tufts of tentacles, the margin of the disc being thus octagonal in form, with eight pedicel-like processes running between the inner central and oral portion and the tufts of the outer margin. The mouth or oral aperture existing in the centre of the bell-shaped body is quadrangular in shape; and a system of canals (radiating canals) extends from the mouth outwards to the margin of the body, where they are united by a circular vessel which runs round the edge of the disc below the tentacles. The bell-shaped body is also capable of being folded up when food or prey is taken into the mouth. They appear to move about in some instances in hydra-like or leech-like fashion, by fixing the tufted tentacles first, and then drawing along the body till fixed by the

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ordinary root or foot-like process, when the tentacles would be freed and once more pushed along and fixed as before. The ova or eggs and reproductive bodies are produced within the body of the Lucernaria itself, and the little embryo, at first ovoid in shape and free-swimming, soon attaches itself and develops the characteristic form of the parent and adult. This is very different from what occurs in certain nearly allied forms to the Lucernaria, the reproductive cycle of some lucernaridan forms showing a very complicated series of phenomena. The Lucernarida differ from the Medusidæ chiefly in the fact that the mouth of the umbrella or bell-shaped body in the former is never more or less completely closed by a 'veil' or membrane; and also in the number of radiating canals, which in the Lucernarida are never less than eight in number, and are connected to one another; whilst in the Medusidæ they are rarely more than four, and do not run into one another. Then also the Lucernarida possess *lithocysts* or organs of sense combined to form single structures covered by a hood-like membrane; whereas in the Medusidæ the organs of sense are separate, existing in the form of distinct ocelli and vesicles, and are, further, unprotected.

LUCERNE, or LUZERN, a central canton of Switzerland, bounded north by the canton Aargau, east by Zug, Schwyz, and Unterwalden, south and west by Bern; area, 587 square miles. The surface is very much broken by ramifications of the Bernese Alps, but none rise above the line of perpetual snow. The Tomlishorn, the culminating point of Mount Pilatus, and of the canton, is 7116 feet above sea-level. Small valleys are numerous, but the only one of much extent is the Entlebuch, which is about 30 miles long, and flanked by mountains clothed with forests or green pastures. The principal rivers are the Reuss, which traverses the canton centrally in a north-east direction; the Aa, Suren, and Wigger, with its numerous tributaries. All these rivers have a direction more or less north, and belong to the basin of the Aar, and through it to that of the Rhine. Lucerne is well supplied with lakes. Within its own boundaries it has those of Sempach and Baldegg, with many more of smaller size; with Zug it shares the Lake of Zug, and with Unterwalden and Schwyz, the most important of all, the Lake of Lucerne. The soil, though generally inclining to sand, is fertile. Corn and fruit are raised in abundance, and a few sheltered spots are laid out in vineyards. Chestnuts, almonds, and figs ripen on the banks of the Lake of Lucerne. In the higher lands the climate is severe, and some of the loftiest summits are never free of snow before the end of May. The pastures are extensive and excellent. Manufactures have not made much progress, but trade, chiefly transit, is considerable. The far greater part of the inhabitants profess the Roman Catholic religion, which is established as that of the canton. The government is vested in the Great Council—consisting of 100 members—eighty elected by the people, and twenty by the eighty. The executive is exercised by the Little Council, consisting of fifteen members elected by the Great Council for three years, under the presidency of an *Avoyer* or *Schultheiss*. For administrative purposes the canton is divided into five bailiwicks, subdivided into seventy-four communes. As a member of the Swiss Confederation, Lucerne ranks third, and is one of the three *directing* cantons or *vororts*. Its contingent of troops is 3717; of money, £1494. Pop. (1880), 134,806.

LUCERNE, a town of Switzerland, capital of the canton of Lucerne, and one of the three seats of the Swiss diets, on an acclivity at the west extremity of Lake Lucerne, traversed by the Reuss, which here issues from the lake, and is crossed by four bridges, of which two are covered and curiously ornamented with pictures suspended from their roof. It is surrounded by a circle of feudal watch-towers, and walled on the land side. The town is well built, and the streets are regular, spacious, clean, and well paved. It has a town-hall, Jesuit college, now partly used for the lyceum; a Jesuit church, parish church, with two ancient towers; Ursuline convent, with handsome church; large town hospital, poor-house, deanery, arsenal, mint, casino, &c.; and besides the college or lyceum, several well-conducted educational establishments. One of the most interesting monuments of Lucerne is that erected to the Swiss guards who fell in Paris in 1792, while defending the Tuileries. It was designed by Thorwaldsen. Lucerne has some transit trade, but the manufactures are unimportant. The environs are rich in beautiful walks and splendid views. Pop. 17,850.

LUCERNE (*Medicago*), a genus of leguminous papilionaceous plants of the tribe of Loteæ, containing at least ninety species. These plants grow spontaneously in the southern and middle parts of Europe. Lucerne is herbaceous; the leaves are usually pinnate-trifoliate; it has small flowers, generally yellow, in axillary spikes. The *Medicago sativa* has blue or violet spikes. It is sometimes cultivated in England, and is considered by authorities who have given attention to its cultivation as one of the most valuable of green-fodder plants. It prospers best on a light and friable, sandy, but rather rich and deep soil. It lasts for nine or ten years, and its roots strike downwards so far that it is less subject than grasses to suffer from drought. It should be sown before the end of the second week of April in rows 12 inches apart, 10 lbs. of seed to an acre. The seed should be new and full; if dry it will not spring so well, and may be tested by putting it in water, when, if not too dry, it will sink. It requires to be carefully kept free of weeds for the first year, but when the roots become strong it needs comparatively little attention. It should be cut before coming into flower, and when cut three times a year will yield from 3 to 5 tons of fodder or more per acre, but it may be cut much more frequently, as often as every month or six weeks from May to October. It is advantageous for soiling cows; it does not, like clover, give a peculiar taste to the milk or butter, but it does not make them so rich as pure grasses. The *Medicago sativa*, on the other hand, is said to be less hardy than red clover, and to require three or four years before attaining its full growth; being thus ill adapted for rotation cropping. The *Medicago falcata*, or Swiss Lucerne, is coarser and hardier.

LUCERNE, LAKE OF, or VIER-WALDSTÄTTERSEE (Lake of the Four Forest Cantons), the largest and in many respects the most magnificent Swiss lake, near the centre of Switzerland, 1406 feet above sea-level, surrounded by the cantons of Lucerne, Schwyz, Uri, and Unterwalden, whence its German name. It is very irregular in its shape, being divided into three reaches, which, separated by narrow straits, cannot be seen from each other, and have consequently the appearance of distinct lakes. The whole length of the lake, measured on a line drawn through its centre from its western to its southern extremity, is about 25 miles; its breadth, measured on its lower branch, from south-west to north-east, is 9 miles, but on an average does not exceed 3 miles. Its depth varies much, and gradually increases from west to east, being near Lucerne 300 feet, in parts of its centre 400 feet, and towards the east and south-east from 600 to 900 feet. It presents every variety of lake scenery. In the upper reach, where lofty mountain masses frown over the lake, and descend in sheer

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precipices to its very edge, it is singularly sublime. Owing to the violent storms which suddenly burst over the lake, its navigation is extremely dangerous. Steamers ply regularly upon it.

LUCIA, St., one of the British West India Islands, 21 miles north by east of St. Vincent, and 20 miles south of Martinique; area, about 270 square miles. It is evidently of volcanic origin, and has generally an elevated, rugged, and mountainous surface. Many of the heights assume very fantastic shapes, and several of them leave no doubt as to their having been, probably at no very remote period, active craters. From one of them, called Soufrière, sulphurous vapours are still continually rising. Two of the most remarkable cones are the Great and Little Pitons, situated near the south-western shore. The greater part of the island is covered with masses of dense and gloomy forest, but the valleys and lower heights are well cultivated and remarkably productive. The decomposed lava, of which the soil consists, possesses almost inexhaustible fertility. Elsewhere the sugar-cane either must be annually planted, or cannot be successfully ratooned beyond the second crop; but here, in ordinary soils, the plant continues productive for six, and in some instances has not required replanting within thirty years. This amazing fertility is counterbalanced by the general unhealthiness of the climate, especially in the marshy valleys. The chief exports are sugar, rum, and cocoa. The total value of the imports in 1881 was £120,134; exports, £168,478. The revenue in 1881 was £32,291; expenditure, £32,652; and the public debt in that year amounted to £33,500. Pop. (1881), 38,551.

LUCIAN, a Greek author, distinguished for his ingenuity and wit, was born in Samosata, the capital of Comagene, on the Euphrates. The time of his birth or of his death is not known, but he flourished in the second half of the second century A.D. He was of humble origin, and was placed while young with his uncle to study statuary; but being unsuccessful in his first attempts, he went to Antioch, and devoted himself to literature and forensic rhetoric, and travelled in several countries (among others, Greece, Italy, Spain, and Gaul) as a rhetorician. On returning home, probably about his fortieth year, he abandoned the profession of rhetoric, which he seems to have partially resumed in his old age, and confined himself to literature. He lived to an advanced age, and was at a late period of his life made procurator of part of Egypt. The works of Lucian, of which many have come down to us, are narrative, rhetorical, critical, satirical, mostly in the form of dialogues. The most popular are those specially known as the Dialogues, in which he ridicules with great wit the popular mythology and the philosophical sects, particularly his Dialogues of the Gods and of the Dead. They have given him the character of being the wittiest of ancient writers. He seems not to belong to any system himself, but he attacks imposture and superstition freely and boldly where he finds them. The Epicureans, who in this respect agree with him, are therefore treated with more forbearance. The Christian religion, of which, however, he knew little, and that only through the medium of mysticism, was an object of his ridicule. In his sarcasm he not unfrequently oversteps the bounds of truth, sometimes repeats calumnies against elevated characters, and occasionally, according to the notions of our time, offends against decency, though in general he shows himself a friend of morality. The best editions of his works are by Bourdelot (in Greek and Latin, Paris, 1615, folio), by Hemsterhuis and Reitz (Amsterdam, 1743, four vols. 4to), and the Bipont (ten vols. 8vo, 1789–93). Among the English translations are those of Spence, Hickes, and Franklin.

LUCIFER (or in Greek, *Phōsphoros*, both meaning *light-bearer*), called by the Greeks the son of Astræus and Eos, by the Latins of Jupiter and Aurora. As leader of the stars, his office, in common with the Hours, was to take care of the steeds and chariot of the sun, and he is represented riding on a white horse, as the precursor of his mother; therefore the morning-star. He is also the evening-star (*Hesperus*), and in this character has a dark-coloured horse. For this reason riding-horses (*desultorii*) were consecrated to him, and the Romans gave him the name *Desultor*. It has long been known that the evening and morning star are one and the same, namely, the beautiful and bright planet Venus. From its meaning the name Lucifer has been applied by Isaiah (xiv. 12) symbolically to the King of Babylon, and from this usage, since the time of St. Jerome, it has been bestowed upon the prince of darkness, whose kingdom is in the Apocalypse denoted by Babylon.

LUCILIUS, Caius Ennius, a Roman knight, grand-uncle to Pompey the Great on the maternal side, born at Suessa B.C. 148, served his first campaign against Numantia under Scipio Africanus, with whom he was very intimate. He is considered the inventor of the Roman satire, because he first gave it the form under which this kind of poetry was carried to perfection by Persius, Horace, and Juvenal. His satires were superior, indeed, to the rude productions of Ennius and Pacuvius, but he in turn was surpassed by those who followed him. Horace compares him to a river which carries along precious dust mixed with useless rubbish. Of thirty satires which he wrote only some fragments have been preserved. In his lifetime these satires had an uncommon popularity. He died at Naples about 103 B.C. The dates of his birth and death, and most of the facts of his life, are disputed.

LUCINA, a surname of Juno (according to some of Diana; according to others the name of a daughter of Jupiter and Juno), derived from the root of *luceo*, I shine. Her festival was celebrated March 1, on which occasion the matrons assembled in her temple, adorned it with flowers, and implored a happy and brave posterity, fecundity and an easy delivery.

LUCKENWALDE, a town of Prussia, province of Brandenburg, government of Potsdam, on the Nuthe, 31 miles south of Berlin. It has a parish and town school, a court of justice, manufactures of woollen and linen cloth, machinery, &c.; a bleachfield, saw-mills, a paper-mill, several breweries and distilleries, and cattle-markets. Pop. 14,706.

LUCKNOW (more correctly Lakhnau), a city, Hindustan, capital of Oude, 580 miles W.N.W. of Calcutta, on both banks of the Gumti, here crossed by four bridges, two of which were built by native rulers, and two by the British since 1856. It is a railway-station on the Oude and Rohilkhand line, by which it is connected with the general system of Indian railways. The river, within the city, is about 100 yards wide, and is navigable for large boats from its junction with the Ganges to a considerable distance up the country. Lucknow, like nearly all eastern cities, has an imposing and picturesque appearance from a distance, with its innumerable minarets, gilded cupolas, and brilliantly-coloured sepulchres and mosques; but like them also, fails to realize on near inspection the promises of the remoter view. Among the most notable buildings are the Kaiserbagh, built by King Wajid Ali Shah in 1850 at a cost of £800,000, now occupied as government offices, and forming a gorgeous pile of domes, pinnacles, terraces, and fountains; the Imâmbarra or holy palace, where Asoof ud Dowlah is buried, now an arsenal and storehouses; the great mosque called the Jamá Masjíd, now a jail; the Hoseinabad or Small Imâmbarra,

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with the mausoleum of Mohammed Ali; and Martinière College, founded by Claude Martin, a Frenchman, who rose to be a general in the Company's service. Besides Martinière College there are Canning College, founded in 1864, and several English schools; also St. John's church, American and Roman Catholic churches; library, hospitals, lunatic asylum, banks, barracks, horticultural gardens, &c. There are besides many stately khans and some handsome mosques and pagodas in various parts of the city, and not a few of them in the meanest and most wretched quarters. The bazaars are kept on the ground-floors of the houses, which are three stories high; the two upper stories are furnished with neatly-carved verandahs, which run like balconies in front of the sitting-rooms. In the environs are the palace called the Secunder Bagh, stormed in 1858; the Dilkoosha, a palace of the second Viceroy Saadet Ali; and the Alumbagh, where Havelock's grave is. The scenery round the city is very pleasing, especially along the banks of the Gumti. Lucknow was one of the chief scenes of the Sepoy mutiny. (See INDIAN MUTINY.) The town is quite modern, having been founded by Asoof ud Dowlah in 1775. Population (1881), 261,303.

LUCRETIA, in Roman legendary history, a lady of distinguished virtue, whose ill-treatment by Sextus Tarquin led to the destruction of the kingdom, and the formation of the republic of Rome. She was the wife of Collatinus, a near relation of Tarquin, king of Rome. Sextus Tarquinius, who contrived to become a guest in the absence of her husband, whose kinsman he was, found means to reach her chamber in the middle of the night, and threatened, unless she gratified his desires, to stab her, kill a slave, and place him by her side, and then swear that he had slain them both in the act of adultery. The fear of infamy succeeded. She afterwards summoned her husband, father, and kindred, and after acquainting them with the whole transaction, drew a dagger and stabbed herself to the heart.

LUCRETIUS CARUS, TITUS, a Roman knight, probably born about 98 B.C. About his life almost nothing is known. He is supposed to have studied the Epicurean philosophy at Athens. He is said to have been made insane by a philtre, and in his lucid intervals to have produced several works; but to have committed suicide in his forty-fourth year. We possess of his composition a didactic poem, in six books, De Rerum Natura, in which he exhibits the cosmical principles of the Epicurean philosophy with an original imagination, and in forcible language. The poem opens with an apostrophe to Venus, allegorized as the representative of reproduction; expounds the maxim that nothing can be produced from nothing, and that consequently no existing thing can be reduced to annihilation. The theory of corpuscles and their properties; the origin of the vital and intellectual principles; of the senses; of the world and the movements of the heavenly bodies; of the rise and progress of society; and of arts and sciences, with other expositions of natural phenomena, are successively treated. As a work of art the poem has received the unanimous praise of critics for the skill with which the most unyielding materials are reduced to a poetic diction full of life and vigour, and of a sustained majesty rarely exhibited in Latin verse. The principal editions are those of Lachmann (third edition, Berlin, 1866), and H. A. J. Munro, with an English translation (third edition, London and Cambridge, 1870). The poem has also been translated into English by Creech, by Busby, and by Good.

LUCULLUS, LUCIUS LICINIUS, the conqueror of Mithridates; a distinguished Roman soldier of the first century B.C. The time of his birth is not known. When a young man he served with distinction in the Marsic war, and accompanied Sulla as quæstor into Asia on the breaking out of the Mithridatic war, B.C. 88. He raised a fleet, and expelled Mithridates from Chios and Colophon; but, acting as the partisan of Sulla, he refused to co-operate with Fimbria, when he had defeated Mithridates at Pergamos, B.C. 85. He, however, defeated the fleet of Mithridates off Tenedos. After peace had been concluded with Mithridates he remained in Asia till B.C. 80. During this time he occupied himself in exacting the tribute imposed by Sulla on the Asiatic cities as a penalty for their revolt, a duty which he performed humanely. In 79 he was elected curula ædile, an office which he held in conjunction with his younger brother, who was then just of age to receive it. Sulla at his death confided to him the guardianship of his son, and the charge of revising his commentaries, a preference which is said to have procured him the enmity of Pompey. After the ædileship he held the office of prætor. On the conclusion of this magistracy he went to Africa, the administration of which province he conducted with ability and impartiality, and in B.C. 74 obtained the consulship in conjunction with M. Aurelius Cotta. As consul he maintained the constitutional laws of Sulla. On the breaking out of the war with Mithridates he obtained the proconsulship of Cilicia and the command of the army. He reached Asia before the close of 74. Mithridates had already made a victorious beginning of the campaign by a naval battle with the Consul Aurelius Cotta, the colleague of Lucullus. Lucullus was therefore compelled to hasten the attack of his land forces. But when he approached the army of Mithridates, and ascertained its strength, he deemed it judicious to avoid a decisive battle, and contented himself with cutting off the king's communications. Mithridates now advanced with a considerable force to besiege the city of Cyzicus, the key of Asia, then in the possession of the Romans. Lucullus, however, defeated his rear-guard on their march thither, and compelled the king to give up his attempt. Lucullus now advanced to the coasts of the Hellespont, prepared a fleet, and vanquished the squadron of Mithridates near the island of Lemnos. This victory enabled him to drive all the other squadrons of Mithridates from the Archipelago. The generals of Lucullus subdued meanwhile all Bithynia and Paphlagonia. Lucullus, again at the head of his army, conquered various cities of Pontus, and although overcome by Mithridates in a battle, he soon acquired such advantages that he finally broke up the hostile army, and Mithridates himself sought protection in Armenia. Lucullus now changed Pontus into a Roman province. Tigranes refusing to surrender Mithridates to the Romans, Lucullus marched against Armenia and vanquished Tigranes, B.C. 69–68. Mithridates, however, contended with various fortune, till Lucullus was prevented from continuing the war against him effectually by the mutiny of his soldiers, who accused him, perhaps not unjustly, of avarice and covetousness. In Rome the dissatisfaction of the soldiers towards Lucullus was found well grounded, he was deprived of the chief command, which was bestowed first on Glabrio, and afterwards on Pompey, and recalled. B.C. 66. After a delay of three years he succeeded in procuring the merited recognition of his services in a public triumph. From this time Lucullus remained a private individual, spending in profuse voluptuousness the immense riches which he had brought with him from Asia. His gardens were laid out with such splendour that Pompey called him the Roman Xerxes, and his feasts were given with a profusion suggestive of inexhaust-

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ible wealth. But he pursued the study of philosophy, induced many scholars to come to Rome, and allowed them free access to his house. He also founded an extensive library, which was free to every one, and of which Cicero made diligent use. His example also induced other distinguished Romans to draw learned men to Rome at their expense. His opposition to Pompey after his return from Asia contributed to force the former into the first triumvirate. Cæsar threatened him with a prosecution for his conduct in Asia, which he resorted to entreaties to avert. Before his death he fell into a state of dotage, and his brother had to take charge of his affairs. He died before B.C. 56, the exact time is not known. Lucullus first transplanted the cherry-tree to Rome from Cerasus, in Pontus.

LUDDITES, a name given in 1812 to malefactors in Nottinghamshire, who destroyed improved stocking-looms as hurtful to the operatives. The mischief was ascribed to an imaginary 'General Ludd.'

LÜDENSCHEID, a town of Prussia, province of Westphalia, 21 miles south-west of Arnsberg, in a mountainous district; with two Protestant churches. It has iron and brass foundries, manufactures of buttons, files, buckles, Britannia-metal ware, and other articles of hardware. Pop. 11,024.

LUDLOW, a municipal and parliamentary borough in Shropshire, on an elevated position, 27 miles south by east of Shrewsbury. It has a town-hall, a guild-hall, a fine old church, a free grammar-school, a reading-room, and a museum. Tanning and malting occupy a small part of the inhabitants, and there are also corn-mills. The remains of the ancient Castle of Ludlow have an interesting and picturesque appearance. The borough returns one member to Parliament. Pop. of mun. bor. 5035; of parl. bor. 6664.

LUDLOW, EDMUND, a distinguished leader of the republican party in the civil wars of Charles I., the eldest son of Sir Henry Ludlow, was born about 1620, at Maiden Bradley, in the county of Wilts, and received his education at Oxford, whence he removed to the Temple in order to study the law. He served with distinction in the parliamentary army, and when 'the self-denying ordinance' took place he remained out of any ostensible situation, until chosen member for Wiltshire in the place of his father. At this time the machinations of Cromwell becoming visible, he was opposed by Ludlow with firmness and openness. With a view of establishing a republic he joined the army against the Parliament, when the latter voted the king's concessions a basis for treaty, and was also one of Charles's judges. With a view of removing him Cromwell caused him to be nominated general of horse in Ireland, where he joined the army under Ireton, and acted with great vigour and ability. When Cromwell was declared protector Ludlow used all his influence with the army against him, on which account he was recalled and put under arrest. Although he refused to enter into any engagement not to act against the government, he was at length allowed to go to London, where, in a conversation with Cromwell himself, he avowed his republican principles, and refusing all security or engagement for submission, he retired into Essex, where he remained until the death of the protector. When Richard Cromwell succeeded he joined the army party at Wallingford House, and was instrumental in the restoration of the Long Parliament, in which he took his seat. The Restoration was now rapidly approaching, and finding the republicans unable to resist it, he quitted the country, and proceeded to Geneva, whence he afterwards, with many more fugitives of the party, took refuge at Lausanne, where Lisle was assassinated by some English royalists. Similar attempts were made on the lives of Ludlow and others; but his caution and the vigilance of the magistracy of Berne protected him, and he passed the remainder of his life at Vevay, with the exception of a brief visit to England after the revolution, from which he was driven by a motion in Parliament for his apprehension, by Sir Edward Seymour, the leader of the Tory party. He closed his life in exile in 1693. Ludlow was one of the purest and most honourable characters on the republican side. His Memoirs contain many particulars in relation to the general history of the times, and are replete with valuable matter.

LUDWIGSBURG, a town of Germany, Würtemberg, 8 miles north of Stuttgart. It is the second royal residence of the kingdom, and is handsome and well built. Most of the streets are spacious and lined with trees, but their appearance is monotonously uniform. The chief buildings are the royal palace, the theatre, and the opera-house. There are manufactures of woollen, linen, and cotton cloths, silks, tobaccos, organs, &c.; an arsenal and a cannon-foundry. Pop. (1881), 16,100.

LUFF (nautical term), the order to the helmsman to put the tiller towards the lee-side of the ship, in order to make the ship sail nearer the direction of the wind.

LUFIJI, one of the most important rivers of the east of Africa. It is supposed to rise in a small lake several degrees south of Unyanyembe, and about the same longitude. In its upper course it is called the Rwaha River. It receives the drainage of the southern slopes of the Usagara and Ugogo country, and falls into the sea opposite the Island of Mafia or Monfia, about 100 miles south of Zanzibar. The copal or fossil gum trade forms the most extensive commerce of the Indian settlers in the trading ports along the coast, on both sides of the delta of the Lufiji.

LUGANO, a town, Switzerland, in the canton of Ticino, beautifully situated on the north shore of the lake of same name, 15 miles north-west of Como. Its white and well-built houses, mostly of three stories and often elegant, have a very imposing appearance. Its principal edifices are several churches, monasteries, nunneries, an old bishop's palace, hospital, and theatre. The manufactures are chiefly spun silk and silk goods, leather, and hats. The transit trade is also considerable, Lugano being the principal entrepôt for the traffic across the lake between Italy and the north side of the Alps. It is alternately with Locarno and Bellinzona the seat of the legislature of the canton Ticino. Pop. 6129.

LUGANO, LAKE OF (Latin, *Ceresius Lacus*), partly in canton Ticino and partly in Italy, between Lakes Como and Maggiore, into the latter of which it discharges itself, is of very irregular shape, consisting of a narrow trunk which throws out arms in all directions. Its length is about 20 miles, and its depth about 100 fathoms. Its scenery is of a very wild and imposing description.

LUGGAGE (law). Railway and other carriers by established usage carry the luggage of passengers free of extra charge. It is also the practice of carriers, particularly of railway companies, to limit the weight of luggage allowed to each passenger by their by-laws, and also to except merchandise intended for sale from passengers' luggage. Although not expressly charged for, and under the charge of the passenger, the carrier is responsible for the safe carriage of luggage, and no notice to the contrary effect will legally free him from the responsibility. Articles of value, however, as jewelry, may be excepted by notice unless the passenger intimates that they are

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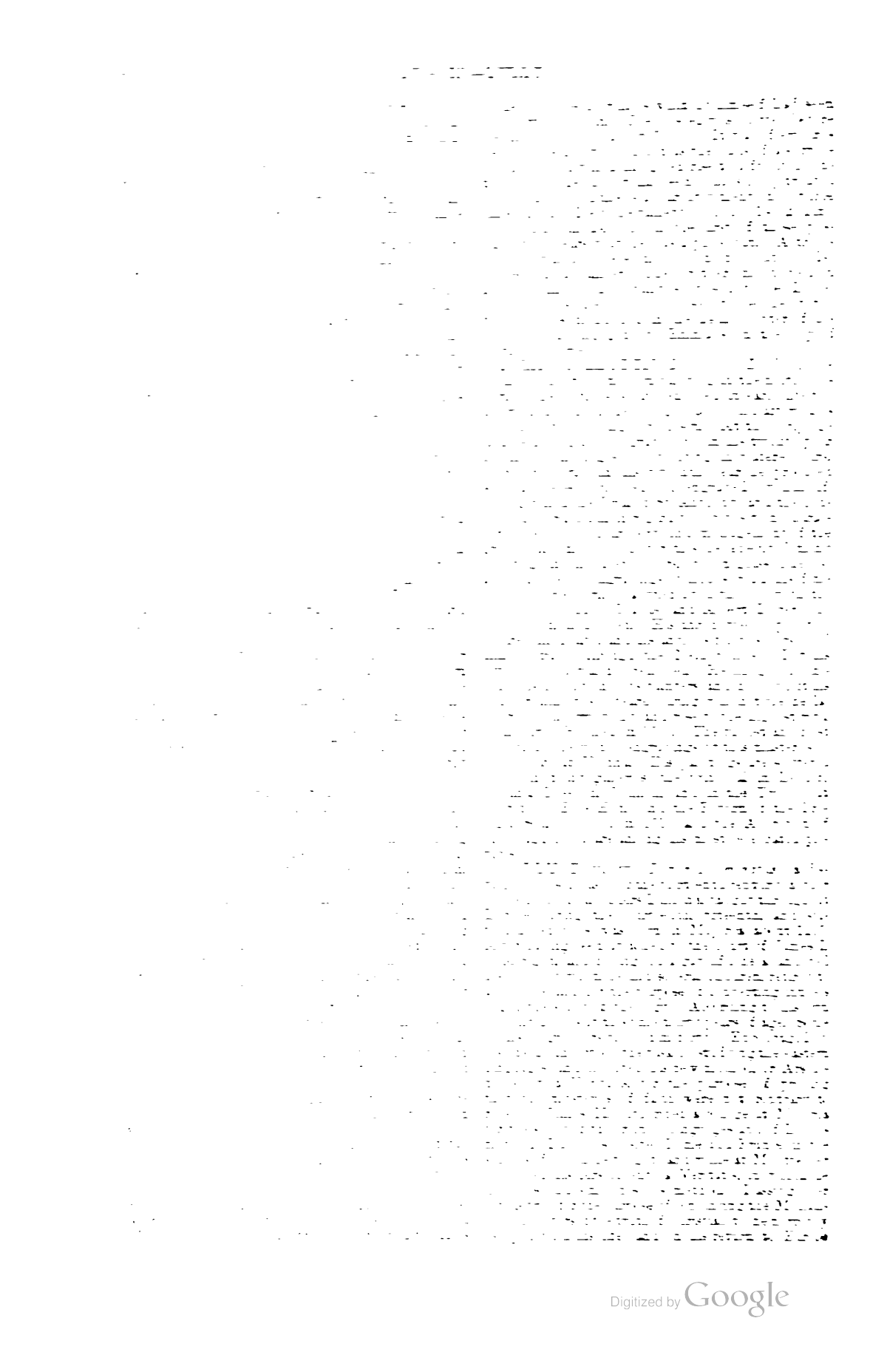

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wrote his Tabula Generalis, a sort of key to his former works, and in 1298 he founded a college in Paris. A second visit to Africa, for the purpose of converting the disciples of Averroes, resulted in his banishment from that region; but he returned a third time, and was stoned to death about 1315. He was canonized in 1419. The number of his works is usually estimated at 300. They include treatises on logic, metaphysics, grammar, theology, discipline, casuistry, law, geometry, astronomy, medicine, and military art. They are mostly compilations illustrative of his art, of which he published numerous expositions under the titles, Ars Generalis, Ars Magna, Ars Cabbalistica, Ars Brevis, Ars Inventiva, Ars Demonstrativa, Arbor Scientiæ. The Ars Lulliana consists mainly in categorizing ideas and combining them mechanically, by which means Lully thought to exhaust their possible combinations. The method was taught and commented on in some schools of little influence in Spain, France, and Italy, but it is hardly necessary to say that it never took root or produced any direct effects. He had, however, some disciples who have reached distinction, among whom the most noteworthy was Giordano Bruno. His teaching is also said to have influenced the scholasticism of the following centuries, which is probably doing it too much honour. One part of his system may be mentioned, as it has been supposed to have given Lord Bacon his idea of the classification of the sciences. These Lully divided into fourteen parts, represented by as many trees. There were the tree of the Virgin Mary, the apostolic tree, which bore theological virtues, the cardinals were its branches, its leaves the seven sacraments, &c. Our readers will be able to judge of the indebtedness of Lord Bacon.

LUMBAGO (from *lumbus*, the loin), a neuralgic affection of the muscles about the loins. See RHEUMATISM.

LUMINIFEROUS ÆTHER. See INTERSTELLAR ÆTHER.

LUMINOSITY. See FLAME (LUMINOSITY OF).

LUMPERS, labourers employed to load and unload a merchant ship when in harbour.

LUMP-FISH, or SUCKER (*Cyclopterus*). This genus of fishes, included in the Teleostean family Gobiidæ or Gobies, is distinguished by the remarkable conformation of the ventral fins. These fins, united by a membrane, form a sucker or adhesive disc of oval and concave shape, by means of which these fishes attach themselves very firmly to any fixed object. So firmly indeed do these fishes thus adhere, that Pennant relates his ability to lift a tub containing several gallons of water by seizing hold of the tail of the fish, which had fixed itself to the bottom of the vessel. The *Cyclopterus lumpus* is the common species. It appears to inhabit the northern European seas chiefly, but frequently occurs around the British coasts. It is a fish from 9 inches to a foot in length, and with a deep thick body, the back arched; of a purplish-black colour, variegated with light red on the back and sides, the under surface and fins being coloured of a crimson hue. The back and sides are provided with rows of bony tubercles, the skin being otherwise soft. The first dorsal fin is inclosed in a thick coriaceous skin. The lump-fish weighs generally about 7 lbs., but the flesh is said to be soft and tasteless. It is, however, highly appreciated as an article of diet by the seals, which devour its flesh but reject the skin. In the spring months the skins of these fish may thus be seen floating in quantities on the coasts of Greenland, the fish having been devoured by the seals when near the land for the purpose of spawning. The smoothness of the water is said to indicate the spot where the ravages of the seals on this fish are being carried on. This species, according to Crantz, forms a chief article of diet with the Greenlanders. The roe is large and oily, and is much esteemed by these northerners. The food of this fish appears to consist chiefly of Medusæ, pteropods or 'whale's food,' and allied forms. The lump-sucker is known in many districts of Scotland under the name of the 'cock-paddle.'

LUNA (the moon), among the Greeks *Selēnē*. Her worship is said to have been introduced among the Romans in the time of Romulus. It did not occupy a prominent place, though apparently more cultivated than that of Sol. She had a temple on the Aventine, one on the Capitol, a third on the Palatine, and a small one between her and Sol in the Via Sacra.

LUNACY. See INSANITY.

LUNACY, in law, is usually associated with idiocy, the former arising from lesion of the faculties, the latter from defective development of them. There are numerous kinds of lunacy, which are variously classed by medical or legal authorities. The rules of law and equity in England as to what constitutes lunacy are identical. Idiots and lunatics are not criminally liable for their acts. The estates of idiots and lunatics are legally vested in the crown; the crown is absolutely entitled to the profits of the idiot's estate, and charges itself with his maintenance; it is only the trustee of the lunatic. A lunatic is never regarded in law as incurable. The lord-chancellor (see CHANCELLOR) is the general guardian of all infants, idiots, and lunatics. In regard to the liability of insane persons for crime it is held that every person is to be considered of sane mind unless it is clearly proved to the contrary. Before the plea of insanity is allowed undoubted evidence must be adduced that the accused at the time he committed the act was of diseased mind, and was not conscious of right or wrong. In the opinion of the judges given in answer to the questions of the House of Lords in 1843, it is not sufficient that the act should have been committed under an insane delusion of effecting some public benefit, if the person committing it knew he was acting contrary to law. Some medical men have attempted to establish a species of insanity called moral insanity, consisting in a morbid perversion of the feelings, affections, and moral dispositions, without notable lesion of the intellect; but this has been justly regarded by judicial authorities as a groundless theory. When a person accused of a crime is acquitted specially on the plea of insanity, he is kept in strict custody till the queen's pleasure be known for his future disposal. If a will or deed be impeached on the ground of insanity the burden of proof rests on the person impeaching it. A monomaniac, or person afflicted with temporary insanity, may be admitted as a witness if the judge on investigation finds that he is aware of the nature of an oath, and capable of understanding the subject on which he is required to testify, and also in the case of lucid intervals. A lucid interval is defined by Lord Thurlow to be an interval in which the mind, having thrown off the disease, has recovered its general habit—not a mere abatement of violence or relief from excessive pressure. It would seem from the almost unanimous testimony of medical men that lucid intervals in this sense do not characterize the ordinary course of any case of mental disease. There are periods of comparative violence and repose; but in both conditions mental alienation is a continuous state, and does not consist in alternations of reason and insanity. On the other hand, it is well known that persons dismissed as cured from lunatic asylums, and able for a time to attend to their affairs, frequently relapse. This may be called a lucid interval or partial cure; but it would seem to establish the possi-

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bility of a temporary recovery of reason in a person who has been afflicted with insanity.

The general principle of law in England is, that before a person suspected of insanity can be deprived of the management of his affairs, or be placed under control, an inquiry must be instituted under a writ of *de lunatico inquirendo*, or of *de idiotâ inquirendo*. The procedure in lunacy is now regulated by the Lunacy Regulation Acts, 1853 and 1855 (16 and 17 Victoria, cap. lxx., and 18 Victoria, cap. xiii.); the general orders of 7th November, 1853, and 25 and 26 Victoria, cap. lxxxvi., 1862. The inquiry is usually conducted before a jury presided over by a master in lunacy; a certificate of the master of lunacy without a trial by jury will suffice in cases of obvious incapacity, where the person judged incapable does not demand a jury. In Scotland the care and custody of lunatics and idiots belong to the Court of Session. Idiots and lunatics are called fatuous and furious; those who are merely of weak intellect are called imbeciles. (See IMBECILITY.) An examination of supposed lunatics takes place before the sheriff and a jury. The procedure in lunacy in Scotland is regulated by 20 and 21 Victoria, cap. lxxi.; 21 and 22 Victoria, cap. lxxxix., and 25 and 26 Victoria, cap. liv.

LUNAR CAUSTIC. See SILVER.

LUNAR THEORY, the mathematical treatment of perturbations in the moon's motion. The attraction of the sun for the earth and moon tends to diminish their mutual action, and this attraction is greater in winter than in summer, so that in winter the moon lags behind, and in summer hastens before her mean place. When the moon is at new or full (when in syzygy) the mutual attraction of the earth and moon is lessened by the sun more than usual, whereas it causes a small increase in the mutual action when the moon is in quadrature (when the line from the earth to the moon is at right angles to the line from the earth to the sun): again, the sun exerts a direct tangential acceleration on the moon which is positive (or towards the sun) when the moon is nearer the sun than the earth, and negative when the moon is further away than the earth; these two produce what is called the *moon's variation*, which, on the whole, is such that in each lunation the moon's velocity is greatest when she is syzygy, and least when nearly in quadrature. Although the sun is so far away that the ratio of the full moon's distance to the earth's distance is nearly equal to the ratio of the earth's distance to the new moon's distance, yet there is not strict equality, and the sun's disturbing influence is therefore less in one-half of the moon's orbit than the other; this produces the moon's *parallactic inequality*, the measurement of which has enabled the ratio of the distances of the sun and moon from the earth to be calculated with considerable accuracy. The *acceleration of the moon's mean motion*, or the increasing rapidity of the moon's motion about the earth, was discovered by Halley; Laplace supposed it due to a change in the earth's orbit; Delaunay refers part of it to the retardation of the earth's axial rotation. For an account of the inequalities due to changes in the inclination of the moon's orbit, in the position of the nodes, and in the eccentricity and position of the perigee and others due to the oblateness of the earth's figure, readers are referred to special treatises. Except Venus, which causes a lunar inequality of long period, the planets exert insensible influences on the moon.

LUNAR YEAR. See YEAR.

LUNATIC ASYLUMS. Until near the close of last century lunatics were treated throughout Europe with a barbarity which it is equally difficult to ex- Idiots and harmless lunatics were generally allowed to wander at large, gaining a precarious livelihood by charity, and exposed to all the arbitrary cruelty to which their defenceless condition made them liable. Those who were confined in asylums were in a still worse case. The treatment to which they were subjected was one of the hardest restraint, and any symptoms of insubordination or violence exposed them to condign punishment. Chains, whipping, and confinement in dark dungeons were among the ordinary discipline of these establishments; and the manners of the attendants on the insane were such as a training in the exercise of this discipline might be expected to produce. The more violent patients were even exhibited to chance visitors for a gratuity like wild beasts. The reformation of this unnatural system was begun in France by Philippe Pinel, a benevolent physician, who after great exertions obtained leave in 1792 to release some of the chained maniacs in the hospital of Bicêtre. It was not till after the close of the long wars between France and England that a better system was introduced into England. A parliamentary inquiry in 1815 into the barbarities hitherto practised in lunatic asylums led to a gradual series of improvements; but so slowly did they make way that the disuse of instruments of restraint was only effected in Hanwell, an asylum containing 800 patients, in 1839. Lunatic asylums of all kinds, whether public or private, are now subject to visitation by, and under the control of officers appointed under special statutes for each of the three divisions of the United Kingdom. Lunatics must be visited at least once a year by medical and legal visitors. Public lunatic asylums for paupers and criminals are kept in each county or borough. The general conduct of lunatic asylums is now brought more into harmony with humanity and common sense. The amount of science brought to bear on the treatment of the insane of course varies in different institutions with the skill of their respective managers. Violence and undue coercion have been generally abandoned, and persuasion and address are relied on for the control of the patients. The degree of confidence exhibited in the patients, and of liberty allowed them, varies considerably in different establishments. In some it is perhaps, under exceptionally skilful or enthusiastic management, carried to an extreme which could not be made a general rule; but there is little danger of excess in this direction. The practice of giving stated occupations, either indoor or outdoor, to the patients whose health will admit of it, is generally adopted. Religious services are provided, and recreations of various kinds, including balls, concerts, and theatrical entertainments, are also commonly and sometimes freely provided. A library, to which the patients have free access, is generally a part of the equipment of these establishments, and frequently there is a printing-press, with a magazine or newspaper got up under the guidance, and filled with the contributions of patients. Notwithstanding all these improvements, some authorities question the advantages of collecting insane patients in large establishments and treating them in the mass. One disadvantage of this mode of treatment must almost inevitably be that the patients will suffer from intercourse with each other. A tendency to insanity is said to be created even in perfectly sane persons by protracted intercourse with the insane. With sensitive patients, especially, the effect of associating with persons whose condition is worse than their own can hardly fail to be deleterious. Besides the disadvantage to health such intercourse must in many ways be painful to the feelings of patients. Notwithstanding occasional fits of exaltation and imagined privileges, which quickly give place to imaginary wrongs,

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mental alienation is in all its stages a gloomy and depressed condition; and a society of patients under restraint for mental malady must be a gloomy and discordant society. Another adverse influence may be noticed, which, though not confined to the management of large establishments, or necessarily associated with them, is one to which they are peculiarly incident, and from which, without special precautions, they can hardly ever be free. In popular belief mental derangement is almost invariably associated with cunning; and this association is frequently spoken of, even by authorities, as if it were, if not a necessary, at least a normal one. If we consider, however, the nature and the causes of mental derangement, we will find it very difficult to assign any reason why cunning should be more than one of the innumerable forms in which it may present itself. Deficiency or excess in the regular action of the brain or nervous system may disturb the mental faculties in many ways; but that it should produce greater secretiveness more frequently than less, or give the organizing faculties that peculiar form of mental activity developed in cunning more frequently than other forms of constructive activity, is a supposition in which there does not appear to be much inherent probability. On the other hand, the observation that cunning is frequently exhibited by the insane is too common not to be founded on fact, but the explanation of it is probably to be sought in the circumstances rather than in the inherent condition of those thus afflicted. Insane persons suffered to wander at large, as well as those confined in asylums since the general disuse of forcible restraint, are being habitually treated with some sort of art by those with whom they come in contact in order to restrain their erratic tendencies. The art necessary to effect this may be of various kinds—persuasive, diversive, or comminatory; but the simplest, and in the first instance most effective form, is mere duplicity and deception. This is frequently used by the unreflecting, and the natural reaction in those who are constantly liable to it is cunning. Unless in the extreme forms of mental alienation, the power of just reasoning is not destroyed, although sustained reasoning is frustrated by the constant intrusion of false premises through defect or confusion of the powers of mental presentation and memory. To add to these defects by voluntary deception is to subject the weakened mind to further injury. It would thus appear that the development of cunning in the insane may often be not the necessary consequence of their disease, but the result of the treatment to which it is subjected; and when it is so it can only be regarded as a complication and aggravation of the original malady. In a large asylum, where the demands on the time of the attendants is constant, the use of so easy a method of control will be almost certain, unless specially discountenanced, to be more or less resorted to; and the gain will be small if force only gives place to deception; in fact, it should be understood, that when it is necessary to choose between them, the former should be preferred to the latter. Wealthy patients are frequently placed under the care of special attendants, and establishments arranged more in the form of an ordinary household have been tried for the treatment of a limited number of patients; but they are liable to some other objections, and especially, in the case of the poor, of the difficulty of their general application being combined with due precautions and proper treatment.

LUNATION. See MONTH.

LUND, a town of Sweden, län Malmö, in an extensive plain, about 8 miles from the Sound, and 24 miles east of Copenhagen. It is a very ancient place, and in Pagan times had risen to such importance as to collect a population of 80,000. It was then surrounded with wooden fortifications, and had its warehouses filled with the merchandise and treasures which the Scanians had carried off in their piratical excursions. In the middle ages it became the see of an archbishop, and the Scandinavian monarchs were elected kings of Scania on a hill in the immediate vicinity. The present town occupies a large extent of space, and is very irregularly built; and though much has been done to improve it in recent times it has still a very antiquated appearance. It has an ancient cathedral, but its chief attraction is its university, opened in 1479, occupying the buildings of an old castle, possessed of a library of nearly 60,000 volumes and MSS., an observatory, a museum, physical cabinet, &c., and attended by about 500 students. There is also a botanical garden and a cathedral school. The manufactures consist chiefly of woollens and other goods; and there are several tanneries and tobacco factories. Pop. (1880), 14,304.

LUNDY ISLAND, England, county Devon, at the entrance of the Bristol Channel, 10 miles N.N.W. of Hartland Point; area, about 2000 acres. It is defended by lofty and precipitous rocks, and is inaccessible except at a small landing-place on the east.

LÜNEBURG, a town of Hanover, capital of a district of same name, on the Ilmenau, and close to the railway from Hildesheim to Harburg, 28 miles southeast of Hamburg. It is walled, and has six gates. It has several squares, but is in general ill built, having dark and narrow streets, and dull, old-fashioned houses. It has a monastery, which was secularized in the seventeenth century, but still contains an extensive library; a castle, arsenal, town-hall, theatre, gymnasium, military academy, military hospital, ordinary hospital, and several other benevolent, educational, and literary institutions. It has manufactures of iron-ware, soda, cement, manure, tiles, &c.; and a considerable trade, particularly transit, carried on by the Ilmenau. Near it are extensive gypsum and lime quarries and a salt mine, which have been worked from a very early period, and the produce of which forms important articles of exportation. Pop. (1880), 19,034.

LUNEL, a town of France, department of Hérault, 15 miles E.N.E. Montpellier, on the canal of its own name and the railway from Montpellier to Nismes, near the right bank of the Vidourle. It has infantry and cavalry barracks, liqueur factories, and numerous distilleries of brandy and spirits; and has a trade in corn, flour, excellent sweet wines, brandy, &c. In the tenth century it was a fortified town, chiefly inhabited by Jews. Its fortifications were razed in 1632 by Cardinal Richelieu. Pop. 6487.

LUNETTE, in the art of fortification, a very vague expression, which in its original signification probably comprised every detached work built in the form of an angle, and consisting of but two faces. It was afterwards used in a more limited sense to denote, 1. Small, generally irregular works, with or without flanks, that are placed in the principal ditch, before the ravelins or other outworks, for the purpose of covering such places of the chief rampart as may be seen from the open field, or of defending from the side such points as through a mistake in the original plan of the fortifications were left unprotected, the guns from the bastions not being able to reach them. 2. Advanced works on or before the glacis, sometimes constructed in the form of an angle, sometimes in the form of the bastion. This kind of lunettes, skilfully disposed on the weak fronts of a place, and arranged in one or two lines so as to flank one another, may check the approach of the enemy for a considerable time, by obliging him to make his

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trenches at a greater distance than he would otherwise have done, and subjecting him to losses in the capture of each lunette. Particular attention must be paid to dispose them in such a manner as to render it impossible for the enemy to attack two lunettes at the same time.

LUNÉVILLE, a town of France, department of Meurthe-et-Moselle, near the junction of the Vezouse with the Meurthe, 15 miles E.S.E. Nancy. It has generally straight streets and regular buildings; a modern and handsome church, a palace, built by Leopold, duke of Lorraine, at the beginning of last century, and subsequently embellished and occupied by Stanislaus, ex-king of Poland; manufactures of common cloth, calicoes, hosiery, lace, &c.; a good deal of wool and cotton is spun, and there are also bleachfields and breweries. Lunéville is one of the largest cavalry stations in France, having very extensive barracks and exercise ground. The treaty of peace in 1801, by which, as a consequence of the battle of Marengo, the Rhine became the French frontier, was signed here. Pop. 18,136.

LUNGS, the sole breathing organs of reptiles, birds, mammals, and in part of amphibians (frogs, newts, &c.), the latter forms breathing in early life by branchiæ or gills, and afterwards partly or entirely by lungs. In the three first-mentioned classes of vertebrates the lungs constitute the sole organs of respiration. The essential idea of a lung is that of a sac communicating with the atmosphere by means of a tube, the *trachea* or wind-pipe, through which air is admitted to the organ, and through structural peculiarities to its intimate parts. The lungs are developed in embryonic life as two little sacs springing from the ventral or abdominal surface of the œsophagus or gullet. At first they are united anteriorly, and at this point the future trachea is produced. The further development of the lung produces a series of tubular structures, which finally become more and more cellular by the sacculation or division of their walls. The sacculation or division into cells of the fully-developed lung is best marked and most perfect in the higher Vertebrata. In lower pulmonated or lung-bearing vertebrates (for example, Amphibia and many snakes), the sacculation is most perfectly seen at the point where the *bronchus* or main division of the wind-pipe enters the lung. This is the most active part of the organ, and the hinder or posterior part may remain smooth, non-sacculated, and otherwise retain much of the characters presented by the organ in early life. The air-tubes—or ultimate divisions of the wind-pipe within the lung—may branch out and ramify throughout the whole interior of the organ, which thus assumes a perfectly sacculated or cellular structure throughout. In the *Chelonia*—tortoises and turtles—and in *Crocodiles*, the lungs may be also entirely cellular, but the bronchi do not give off branches within the organs. In Birds again, which exhibit certain peculiarities in the structure of their lungs, each lung is composed of fine air-tubes with sacculated walls, which tubes are given off at right angles from the larger tubes, and these latter come off similarly at right angles from the main bronchi themselves. In Birds, therefore, the thoroughly cellular condition of the lungs seen in Mammalia is represented by the mere sacculated walls of the air-tubes. In Fishes the lungs of higher forms are represented by the *swimming* or *air bladder*, which when traced throughout the fish class, and as observed in the *Lepidosiren* or Mud-fish (see DIPNOI), is seen ultimately to assume not only the form and relations, but also the functions of lungs. In the Mammalia, including man, the lungs are confined to and freely suspended in the cavity of the *thorax* or chest, which is completely separated from the abdominal cavity by the muscular *diaphragm* or 'midriff.' In Birds the lungs are attached to the dorsal side of the ribs, the thorax or chest in all vertebrate classes lower than the Mammalia being more or less continuous with and not distinctly separated from the abdomen. In lower forms (for example, snakes, siren, &c.) the lungs may therefore extend throughout the whole length of the abdominal cavity. Sometimes even among mammals the lungs exhibit an inequality in size. Thus in the Porcupines and Musk-deer the right lung is much larger than the left, and in Serpents particularly one lung is generally rudimentary and functionally useless, or may even be entirely absent and unrepresented. In Birds, and in *Cetaceans* (whales, &c.) among mammals, the lungs are not divided into separate portions or lobes. In Man, and in many other members of his class, the lungs are lobular. Thus in the Marmots the right lung has five lobes, the left exhibiting a division into three; and in the Porcupine the right lung has six and the left five lobes. In Ornithorhynchus, or the 'Duck-billed Water Mole' of Australia, a median appendage or lobe exists, and lies between the heart and midriff; and in the elephant's lung this little single lobe exists, although the lungs do not exhibit any division into lobes.

In man the right lung is shorter and broader than the left lung. Both lungs are invested by a delicate serous sac termed the *pleura*, each lung being inclosed within its own pleura. Each pleura is a completely closed double sac, one side of the sac lining the chest, whilst the other side or part is reflected over the lung. The pleura thus lines the ribs and part of the breast-bone, and from this latter structure it is reflected backwards over the *pericardium* or bag in which the heart is inclosed. It next passes over great part of the *root* of the lung, or that portion where the great blood-vessels enter and leave the organ. Thence it is reflected over the whole lung to the back portion of the root, from which point it passes over the sides of the vertebræ, and thence to the ribs, where our examination of the pleura began. The only fold or ligament formed by the pleura throughout its course is the *ligamentum latum pulmonis*, a broad fold which runs from the root of each lung to be attached to the diaphragm. The two pleural sacs inclose two spaces between them in the antero-posterior plane of the chest, which are known as the *anterior* and *posterior mediastina;* and some anatomists describe in addition a *middle mediastinum*. These spaces and their contents are more fully noticed in the article MEDIASTINUM. In the dead subject, and frequently in diagrammatic representations of the pleuræ, a space is seen between the outer surface of the lung and the inner surface of the pleura, by which it was covered. This is due in the dead subject to the recoil of the lung on the admission of air by the opening of the chest to what has been a perfectly closed cavity. But in health and during life the surfaces of the lung (outer) and pleura (inner) are closely applied to each other. The inner surface of the pleura is smooth, glistening, and lubricated by serous fluid, so that the surface of the lung slides easily over it in the movements of respiration. In disease, and where inflammatory products especially have been thrown out on the surface of the pleura, the movement of the lung on the roughened surface produces the so-called 'friction sound' of the physician. The lungs are situated one on each side of the heart, and in shape each presents a form which may be most nearly described as conical. The apex of each lung or cone fits into the upper corner of the chest, about an inch above the collar-bone, at the point where it joins the breast-bone. The base of each

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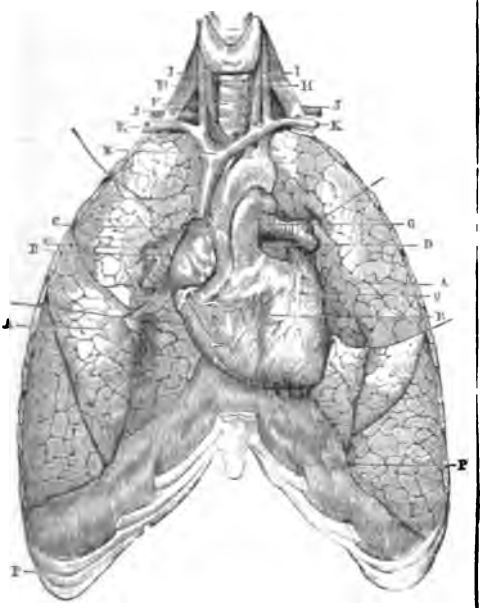
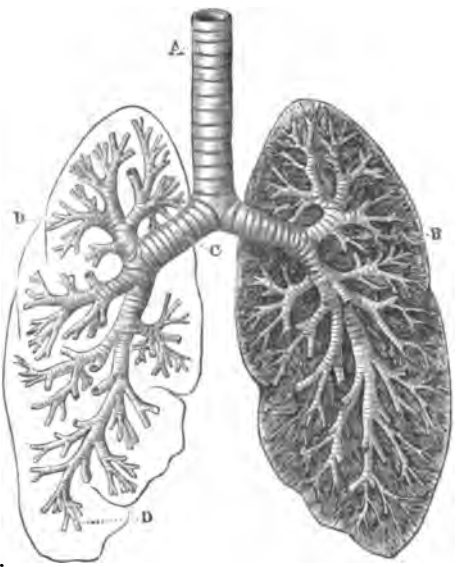
lung lies upon the diaphragm. The outer surface is convex, the inner surface is concave, and receives the heart. The right lung has already been stated to be shorter and broader than the left, this diminution in length being due to the limitation of the thoracic cavity of the right side by the pushing up of the diaphragm by the liver. Each lung exhibits a broad division into an upper and lower portion or *lobe*. This separation is marked by a deep cleft, which ex-



Lungs and Heart.—A. Lungs, with the anterior edges turned back to show the heart and bronchi. B. Heart. C. Aorta. D. Pulmonary artery. E. Ascending vena cava. F. Trachea. G, G. Bronchi. H. H. Carotid arteries. I, I. Jugular veins. J, J. Subclavian arteries. K, K. Subclavian veins. P, P. Costal cartilages. Q. Anterior cardiac artery. R. Right auricle.

tends from below the apex and runs downward in an oblique direction to the front of the organ. The upper lobe of the right lung becomes divided in turn by a fissure which runs nearly at right angles to the main cleft, and which thus maps off a third portion of the right lung to form the *middle* lobe of that organ. The left lung has therefore but two lobes, whilst the right lung has three. Each lobe of the lung is subdivided into a large number of smaller portions, to which the name of *lobules* has been applied. These lobules may be readily seen, marked out on the surface of the human lung by deposits or lines of black pigmentary matter, each lobule measuring from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter. If we examine the intimate structure of one lobule of the lung we may gain an idea of the essential structure of the whole organ; since each lobule resembles its neighbours, and since the whole lung is merely an aggregation of lobules. Each lobule consists of numerous air-cells, supplied by a bronchial or air tube; of blood-vessels, by which the blood is brought to or returned from the lobule; of nerves; of lymphatic vessels; and of areolar tissue, by which these different parts and structures, as well as the lobules themselves, are connected or bound together. The trachea or windpipe divides about the level of the third dorsal vertebra into two main branches, the right and left *bronchi*, one of which enters the root of each lung. The right bronchus is shorter than the left, and at the root of its lung each divides in turn into two branches, one branch going to supply the upper lobe or portion, and the other the lower lobe of the lung; the lower branch of the right lung sending a third offshoot to supply the middle lobe. Within the lung these main divisions of the bronchus ramify and divide and subdivide, as the 'bronchial tubes,' until at length the ultimate and minute ramifications of the air-tubes lead into the air-cells, of which the lobules of the lung have been already stated to be chiefly composed. A small bronchial tube thus enters each lobule, and within the lobule it further subdivides, its walls gradually growing thinner until its ultimate and terminal branches exhibit widenings or funnel-shaped dilatations, each composed of numerous small sacs or *air-cells*, and known as an *ultimate* lobule or *infundibulum*. The air-cells of each infundibulum inclose and communicate with a central irregularly disposed oblong space known as the *intercellular passage*. This passage is merely the dilated extremity of the bronchial tube, and it gradually becomes continuous with the better-defined air-tube before it becomes expanded to form the infundibulum. The air-cells vary in arrangement upon the intercellular passage. They may exist singly, and thus may resemble round recesses from the passage. Their more general arrangement is in groups or rows like sacculated tubes, between which free communication exists, whilst they all open by a single orifice into the common tube. Pressure may also cause the air-cells of the lung to assume various forms and shapes. The walls of the



Section showing the Ramifications of the Bronchi in the Lungs.—A. Trachea. B, C. Bronchi. D, D. Bronchial tubes.

air-cells are generally in contact with each other, and the average diameter of the cells is about $\frac{1}{150}$ to the $\frac{1}{70}$ of an inch, although sometimes the diameter does not exceed the $\frac{1}{300}$th of an inch. In transverse section the walls of the cells are seen to be composed of a delicate areolar membrane strengthened by elastic tissue, which supports the closely-set net-work of capillary blood-vessels, to be hereafter described. And internally the air-cells, as also the interior of

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the terminal air-tube, are lined by a layer of *squamous* or *tessellated epithelial* cells, which, unlike the epithelial cells of the windpipe, are not furnished with *cilia* or vibratile filaments. The pulmonary net-work of capillary blood-vessels, resulting from the ultimate ramifications and subdivision of the blood-vessels of the lung, are situated outside and between the walls of the air-cells. This net-work is the most dense and thickly-set in the body, the capillaries of which it is composed averaging $\frac{1}{3000}$ of an inch in diameter. The blood brought in the course of the circulation to be purified by the respiratory process, therefore ultimately finds its way into this dense pulmonary net-work of vessels, the venous or impure blood in the vessels being thus separated from the oxygen in the air-cells, only by the thin walls of the capillaries in which it is inclosed, and by the equally delicate walls of the air-cells. And through these thin membranes the essential part of the respiratory process, namely, the interchange of gases, is effected in the most simple yet admirable and effective manner. The central cells of the lung are the smallest in the organ, and the capillary net-work is more dense than that of the more superficial or peripheral cells. This arrangement is in relation to the greater amount of air which the central portions of the lungs receive. The air-cells of different and adjacent lobules communicate indirectly only through the tubes or intercellular passages; the occlusion of a main bronchial tube depriving of air all the lobules which are supplied by its subdivisions and branches. The larger bronchi have their walls strengthened and kept patent by cartilaginous rings, and in the walls of such larger tubes elastic tissue and unstriped muscular fibres are found, whilst internally they are lined with *ciliated epithelium*. As the main bronchi subdivide into smaller branches within the lung, their walls become thinner, and the gristly rings less numerous. In the smaller tubes the rings are at length represented by mere cartilaginous particles; and when the tubes gradually become still more minute, the cartilaginous rings disappear entirely, leaving the walls to be composed of elastic membrane encircled with muscular fibres; whilst the mucous membrane and ciliated epithelial cells form an inner lining. The elasticity of the lung-tissue, by means of which the lungs spontaneously expel part of the air which may be injected into them, is due to the elasticity and action of the contractile tissues and membranes found in the walls of the bronchial tubes and air-cells. The surface of the lung also exhibits a layer of delicate elastic tissue, which aids in its contractility, and which has been sometimes described by anatomists as a distinct or inner pleural layer. In some animals (for example, the seal) this latter tissue becomes highly developed. The lungs are popularly termed 'lights;' this from the reason that they are the lightest organs in the body, and float when placed in water; except in diseased conditions, as after chronic inflammations, where the lung-tissue becomes filled up with the product thrown out, and exhibits a hepatized or solid and liver-like structure, when it at once sinks. This characteristic floating of healthy lungs is made use of in medical jurisprudence as a test—hydrostatic test—and proof that respiration has taken place in infants supposed to have been murdered, respiration being life in the eye of the law. The importance, therefore, of ascertaining whether or not the child has breathed, has led medical jurists to pay especial attention to this test. In the infant the lungs are of a light-red colour, but in adult life the lung-tissue become more or less infiltrated with black matter, probably of carbonaceous nature, and which has been inhaled in the process of breathing. This is proved to be actually the case in those individuals whose trade exposes them to the influence of such particles. Coal-miners particularly may be cited as offering examples of this phenomenon; the lungs of these men in advanced life presenting a singularly black appearance, which is known by the name of 'coal-miners' lung.' And to show how liable the lung is to be affected by the atmospheric particles, it may be mentioned that stone-masons and needle-grinders generally suffer much from inhaling the particles by which they are surrounded; the former inhaling the stone-dust, and the latter the dust of steel. In either case, much irritation, leading to serious disease, is set up in these organs.

The root of the lung has already been described as that portion of the lung, situated towards the middle of the inner aspect of the organ, by which the blood-vessels and nerves enter the structure. The pulmonary arteries bringing the venous or impure blood *from* the right ventricle of the heart to be purified, and the pulmonary veins carrying the pure blood *to* the left auricle of the heart to be circulated anew through the body, enter and leave the lung respectively at the root. The pulmonary artery divides along with the bronchial tubes, and ends as described in the dense capillary net-work of vessels surrounding the air-cells. The lung-tissue itself is nourished by the *bronchial arteries*, which number two or more in each lung. They are distributed along the course and divisions of the bronchial tubes. The *bronchial veins* of the right lung, returning the venous blood from the lung-tissue, empty themselves into the *vena azygos;* those of the left lung joining the *superior intercostal vein*. The lungs are supplied with *nerves* from the *pneumogastric nerve* and *sympathetic system;* the supply from the latter source indicating the semi-involuntary and organic nature of the respiratory movements. The nerves enter the lungs with the bronchial tubes, and form a plexus or nervous net-work both in front and behind the tubes. These plexuses are known as the *anterior and posterior pulmonary plexus* respectively. For details of the respiratory movements, &c., see article RESPIRATION.

LUPERCALIA, a Roman festival celebrated annually in honour of Lupercus, an ancient pastoral god of the Italians, afterwards identified with the Arcadian Pan, who protected the flocks against wolves and gave them fertility. The festival dates from the earliest period of the history of Rome; it was held on the Lupercal, where Romulus and Remus were supposed to have been nurtured by a she-wolf. The day of celebration was the 15th of February, which was originally the last month of the Roman year. It was a feast of expiation, and the month of February, the month of expiation, took its name from its occurrence. The officiating priests, called *luperci*, assembled at the altar of Lupercus in a sacred grove, and sacrificed goats and young dogs. Two noble youths were then brought to them, whose foreheads were touched with the bloody sacrificial knife, and the blood stains wiped off with wool dipped in milk. On the performance of this ceremony the youths were required to break out into a shout of laughter. After the sacrifice the luperci partook of the sacrificial feast, which was abundantly supplied with wine. The skins of the goats which had been sacrificed were then cut up, and the luperci covered their loins and other parts of their bodies with them, in imitation of the costume of the god. Thus arrayed, without other clothing, and carrying thongs made of the rest of the goat-skins, they ran through the city striking all the persons they met, particularly the women, who threw themselves in their way, believing that the ceremony made them fruitful and facilitated child-bearing.

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LUPINE, a genus of leguminous plants, containing about thirty species, which are herbaceous or frutescent, bearing petiolate and usually digitate leaves, and large handsome flowers, which are disposed in a terminal raceme. The species inhabit Europe, the basin of the Mediterranean, and the temperate parts of North and South America, especially of the former, where they are extremely abundant. Many species of lupine are cultivated in our gardens for the purpose of decorating flower-beds.

LUPULIN. See HOP.

LURGAN, a market-town of Ireland in the county of Armagh and province of Ulster, 20 miles south-west of Belfast, and having a station on the Ulster Railway. It consists principally of one spacious street lined with fine buildings, and for cleanliness and regularity Lurgan is not surpassed by any other inland town. It contains a handsome Episcopal church, a Roman Catholic church, and several Dissenting chapels; a nunnery; a model and four National schools, and a classical and agricultural school; a town-hall, court-house, mechanics' institute, news-rooms, linen-hall, and union workhouse; a large tobacco factory, breweries, power-loom factories chiefly engaged in the linen trade, coach-building works, and establishments for the hem-stitching of cambric handkerchiefs by steam-power, a new branch of the linen industry of the town. In the neighbourhood is Brownlow Hall, the seat of Lord Lurgan, a noble Elizabethan structure surrounded by a magnificent demesne. Pop. (1881), 10,135.

LUSATIA (in German, *Lausitz*), an extensive country bordering on Bohemia to the south, Meissen to the west, Brandenburg to the north, and Silesia to the east. It was formerly divided into two independent margraviates, Upper and Lower Lusatia, with a superficial area of 4250 square miles, and a population of about 600,000. With the exception of the circle of Kottbus, which had fallen into the hands of the house of Brandenburg in 1550, Lusatia was granted to the Elector of Saxony in 1635. In 1815 all Lower Lusatia (1740 square miles), with a large part of Upper Lusatia, was ceded to Prussia (in all 3200 square miles, with 294,700 inhabitants), and was annexed to the governments of Frankfort and Liegnitz. The part of Upper Lusatia which remained to Saxony (1050 square miles, with a population in 1880 of 351,326) now forms the circle of Bautzen, comprising the eastern part of the kingdom. It is not very fertile, hardly supplying half of the consumption of its inhabitants. Flax is raised in all parts, but great quantities are imported for the use of the manufacturers. Linen, woollen, and cotton are the principal manufactures.

LUSITANIA, a part of Spain whose extent and situation have not been accurately defined by the ancients. It occupied about two-thirds of the west coast of the peninsula, and extended farther into the interior than Portugal does. The inhabitants were warlike, and the Romans conquered them with great difficulty. They generally lived upon plunder, and were rude and unpolished in their manners.

LUSTRATION, purification; in particular the solemn purification or consecration of the Roman people, by means of an expiatory sacrifice (*sacrificium lustrale*), which was performe l after every census. The sacrifice consisted of a bull, a sow, and a sheep or ram (*suovetaurilia*). The ram was dedicated to Jupiter, the swine to Ceres, and the bull to Mars. As this lustration took place at the end of every five years *lustrum* came to signify a period of five years.

LUTE, a stringed musical instrument formerly much in use, anciently containing six strings (or rather eleven, for the five largest were doubled), but the number was gradually increased till it reached twenty-four. The lute consists of four parts, viz. the table, the body, constructed of nine convex ribs; the neck, which has as many frets or divisions; and the head or cross, in which the screws for tuning it are inserted. In playing this instrument the performer strikes the strings with the fingers of the right hand, and regulates the sounds with those of the left. The notes of the lute are generally written on six lines, and not on five. There were formerly various kinds in use. The lute, simply constructed, is called the *French lute;* if it has two necks, one of which sustains the bass notes, it is called a *theorbo;* if the strings of the theorbo are doubled, it is called an *arch-lute.* This instrument, once as popular over the whole of Europe as the guitar is in Spain, has now gone out of use.

LUTHER, MARTIN, the great religious reformer, was born at Eisleben, November 10, 1483. Hans Luther, his father, a miner in very humble circumstances, removed with his family to Mansfield in 1484, and after many years of persevering labour here under somewhat more favourable circumstances he acquired a house and two furnaces, and in the course of time was appointed to a seat in the council. Martin was educated in the deepest respect for religion, and under the severest discipline, being whipped, sometimes till the blood came, as often as fifteen times a day. At the age of fourteen he was sent to the school at Magdeburg, whence he removed in 1498 to Eisenach. At first he obtained his support by singing songs at the doors, like many other poor scholars; but he was soon taken under the care of a benevolent lady named Ursula Cotta. At school he made rapid progress in Latin and other studies; in 1501 entered the University of Erfurt; in 1503 received the degree of Master, and delivered lectures on the physics and ethics of Aristotle. About this time he discovered in the library of the university a Latin Bible, and found, to his no small delight, that it contained more than the excerpts in common use. He was destined by his father to the law, but his more intimate acquaintance with the Bible, of which the clergymen of that time knew only the Gospels and Epistles, induced him to turn his attention to the study of divinity. The impression produced on him by the sudden death of his friend Alexis, uniting with the effect of his early religious education and his poverty, decided him to devote himself to the monastic life. Contrary to the wishes of his father he entered the monastery of the Augustines at Erfurt in 1505, and submitted patiently to all the penances and humiliations which the superiors of the order imposed upon novices. But he always regarded himself as an unprofitable servant. Pure and innocent as he was he tortured himself with bitter reproaches, and was attacked by a severe fit of sickness, during which one of the elder brothers consoled his troubled heart and promised him the forgiveness of his sins through faith in Jesus Christ. This doctrine, almost forgotten in the zeal of the clergy for good works, as they called them, and in the traffic in indulgences, brought a new light into the soul of Luther. He was also encouraged by the paternal mildness of Staupitz, the provincial of the order, who, perceiving his extraordinary talents and acquirements, delivered him from the menial duties of the cloister, and encouraged him to continue his theological studies.

In 1507 he was consecrated priest, and in 1508, by the influence of his patron, Staupitz, he was made professor of philosophy in the new University of Wittenberg. In this sphere of action his powerful mind soon showed itself. He threw off the fetters of the scholastic (Aristotelian) philosophy, so intimately connected with the Papal hierarchy, asserted

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the rights of reason, and soon collected a large number of disciples. In 1510 he visited the court of Pope Leo X. at Rome on business connected with the order. This journey revealed to him the irreligion and corruption of the clergy at Rome, and destroyed his reverence for the sanctity of the pope. After his return he became a preacher at Wittenberg, and in 1512 he was made a Doctor in Theology. As such his oath bound him, as he thought, to the fearless defence of the Holy Scriptures. His profound learning, which embraced an intimate acquaintance with the ancient classics, the fathers of the church, and the spirit of the Greek and Hebrew languages, together with the fame of his eloquence, soon made Luther known to the principal scholars, and esteemed as a powerful advocate of the new light which was breaking upon the world. Great, therefore, was the attention excited by his ninety-five propositions given to the world October 31, 1517, and intended to put an end to the sale of indulgences by the Dominican Tetzel. Luther was compelled to this course solely by the love of truth and by his indignation against the traffic in indulgences, the unhappy effects of which had appeared already in his congregation at Wittenberg. His propositions were condemned as heretical as soon as they appeared. Hogstraaten, a Dominican at Cologne, Dr. Eck at Ingolstadt, and Prierias, an officer of the Roman court, immediately began an attack upon Luther; but neither their invectives, nor the Papal summons to Rome, which he did not obey, nor the mild exhortations of the Cardinal Cajetan at Augsburg in 1518, and of the nuncio Miltitz at Altenburg in 1519, with alluring offers from the pope himself, were sufficient to induce him to recant. He replied to his opponents with boldness and determination, and even after his dispute with Eck at Leipzig in 1519 he still maintained the invalidity of indulgences and of the Papal supremacy. No one answered him, and he appealed with justice from the decision of Cajetan to the pope, and from the pope to a general council.

In 1520 Luther and his friends were excommunicated. His writings were burned at Rome, Cologne, and Louvain. Indignant at this open act of hostility after his modest letter, in which he had showed himself desirous of reconciliation, declared his submission to the pope, and advised a reform in the church, Luther burned the bull of excommunication and the decretals of the Papal canon at Wittenberg, December 10, 1520. By this act he dissolved all connection with the pope and the Roman Church. Frederick, the elector of Saxony, seemed in a doubt whether he should protect him. But the worthiest of the German noblemen, Hutten, Sickingen, Schaumburg, whom he called upon to defend the new opinions, hailed him as the champion of religious liberty, and offered him the protection of their fortresses and their arms. But Luther wished no protector but God. A few months later he was summoned by the newly elected German emperor, Charles V., before the Diet of Worms, and resolved to go in spite of all the remonstrances of his friends. He was met by about 2000 persons on foot and on horseback at the distance of a league from Worms. Such was his conviction of the justice of his cause that when Spalatin sent a messenger to warn him of his danger he answered, 'If there were as many devils in Worms as there are tiles upon the roofs of its houses I would go on.' Before the emperor, the Archduke Ferdinand, six electors, twenty-four dukes, seven margraves, thirty bishops and prelates, and many princes, counts, lords, and ambassadors Luther appeared, April 17, in the imperial diet, acknowledged all his writings, and on the following day made his defence before the assembly. He concluded his speech of two hours in length with these words: 'Let me then be refuted and convinced by the testimony of the Scriptures or by the clearest arguments, otherwise I cannot and will not recant, for it is neither safe nor expedient to act against conscience. Here I take my stand; I can do no otherwise, so help me God! Amen.' He left Worms, in fact, a conqueror; but it was so manifest that his enemies were determined upon his destruction that Frederick the Wise conveyed him privately to the Wartburg to save his life. Neither the proscription of the emperor nor the excommunication of the pope could disturb him in his retirement, of which he took advantage to translate the New Testament into German. But this retirement continued only ten months. When informed of the disturbances excited by Carlstadt on the subject of images he could no longer endure restraint, notwithstanding the new outlawry which the emperor had just issued against him at Nürnburg; and at the risk of provoking the displeasure of the elector he hastened to Wittenberg, through the territory of George, duke of Saxony, who was one of his most bitter enemies. The letter to Frederick, in which he justified his departure, proves, not less than his conduct before the Diet at Worms, his fearless courage and the greatness of his soul. The sermons which he delivered for eight successive days after his return (in March, 1522) to quell the violence of the enraged insurgents in Wittenberg are patterns of moderation and wisdom and popular eloquence. They show in a striking light the error of those who consider Luther only as a violent and rude fanatic. He was violent only against malignity or when he thought the great truths of religion in danger. Such motives sufficiently account for his caustic reply to Henry VIII., king of England, and the bitterness of spirit manifested in his controversies with Carlstadt and Erasmus. The latter, not without reason, he charged with worldliness and lukewarmness in a good cause. He viewed the attack of Carlstadt on his doctrine of the sacrament as an open apostasy from the faith and an act of ambitious jealousy.

Amidst these disputes and attacks his plans for a total reformation in the church, which was called for by the voice of the nation, were matured. In 1523 at Wittenberg he began to purify the liturgy from its empty forms, and by laying aside his cowl in 1524 he gave the signal for the abolition of the monasteries and the better application of the goods of the church. In 1525 he married Catharine von Bora, a nun, who had left her convent. After overcoming numerous difficulties he took this important step at the age of forty-two years as much from principle as inclination, with the design of restoring the preachers of the gospel to their natural and social rights and duties. Warm as was the zeal of Luther for a reform in the church he was desirous of avoiding disorder and violence. While he went hand in hand with the imperial cities and foreign princes both in words and actions he opposed most decidedly the violence of the peasantry and of the Anabaptists. His enemies have shown great injustice in implicating him as the author of those outrages which arose from the enthusiasm of the ignorant. The opposite fault of having too little sympathy with the blind striving of the masses after a purer light and his constant leaning to the nobility for co-operation and assistance may be with more reason laid to his charge. Luther prepared, from 1526 to 1529, a new church service, corresponding to the doctrines of the gospel, under the patronage of the elector, and with the aid of Melanchthon and other members of the Saxon Church. His larger and smaller catechisms, to be used in schools, were also of great service. But every one must look with pain upon the severity and intolerance which

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he manifested towards the Swiss reformers because their views differed from his own in regard to the Lord's supper. (See LORD'S SUPPER and SACRAMENT.) He was thus the chief cause of the separation which took place between the Calvinists and the Lutherans. But without his inflexible firmness, in matters of faith, he would have been unequal to a work against which artifice and power had arrayed all their forces.

The rapidity with which the Reformation advanced after the Confession of Augsburg in 1530 rendered the Papal bulls and the imperial edicts against Luther inefficient. But he was obliged to be continually on his guard against the cunning Papists, who strove to make him give up some parts of his creed; and it required a firmness bordering on sternness and obstinacy to maintain the victory which he had won. With a spirit incident to such a state of things Luther wrote in 1537 the Schmalkaldic articles; he gave a refusal to the ambassadors of Brandenburg and Anhalt, who were sent in 1541 by the Diet of Ratisbon to make him more compliant towards the Catholics; and in 1545 he refused any participation of his party in the Council of Trent.

The severity which he used in the defence of his faith by no means diminishes the merit of his constancy; and an apology may easily be found for the frequent rudeness of his expressions in the prevailing mode of speaking and thinking; in the nature of his undertaking, which required continual contest; in the provocations by which he was perpetually assailed; in his frequent sickness; and in his excitable imagination. The same excitability of temperament will serve to explain those dreadful temptations of the devil which disquieted him oftener than would seem compatible with his strength and vigour of mind, for that age regarded the devil as a real personage, an evil principle ever active; and if any one devoted himself to the cause of God he was constantly obliged to resist attacks of the evil one upon his virtue. He says himself, 'I was born to fight with devils and factions. This is the reason that my books are so boisterous and stormy. It is my business to remove obstructions, to cut down thorns, to fill up quagmires, and to open and make straight the paths; but if I must necessarily have some failing let me rather speak the truth with too great severity than once to act the hypocrite and conceal the truth.' No one can behold without astonishment his unwearied activity and zeal. The work of translating the Bible, which might well occupy a whole life, he completed, with some assistance from Melanchthon and other friends, from 1521 to 1534, and thus rendered his name immortal. This translation bears the same relation in Germany as our authorized version does in England to the religious life and literature of the people. He equalled the most prolific authors in the number of his treatises on the most important doctrines of his creed. After the year 1512 he preached several times every week, and, at certain periods, every day; he officiated at the confessional and the altar; he carried on an extensive correspondence in Latin and German on various subjects with men of rank and of distinguished literary attainments, and with his private friends; and notwithstanding all this press of occupation he allowed himself some hours every day for meditation and prayer, and was always accessible to visitors. He gave advice and assistance wherever it was needed, and interested himself for every indigent person who applied to him. In company he was always lively, and abounded in sallies of wit and good humour, preserved in his Tischreden (Table-talk); he was temperate in his enjoyments. Luther was no stranger to the elegant arts. His excellent hymns (Ein' feste Burg, Aus tiefer Noth, &c.) are well known. His fondness for music too was such that as often as circumstances permitted he would relax his mind with musical composition, singing, and playing on the flute and lute. But few men are equal to such excessive labour; and with a weaker constitution such a constant round of action and vicissitude and toil would soon have overcome the great reformer. Indeed from the year 1531 he had a painful disease (the stone, accompanied with vertigo) to contend with, and in several fits of sickness was brought near the grave; but he lived to the age of sixty-three. Just before his last journey to Eisleben, where he was summoned by the Count of Mansfield to settle a dispute, he wrote, in a letter to a friend, the following description of his condition:—'Aged, worn out, weary, spiritless, and now blind of one eye, I long for a little rest and quietness; yet I have as much to do in writing and preaching and acting as if I had never written or preached or acted. I am weary of the world, and the world is weary of me; the parting will be easy, like that of the guest leaving the inn; I pray only that God will be gracious to me in my last hour, and I shall quit the world without reluctance.' He wrote this in January, 1546. On the 18th of the succeeding February he died at Eisleben, and was buried in the castle church of Wittenberg. He left a wife, whom he tenderly loved, and four children (two others having previously died), in straitened circumstances. His wife died in 1552. The male line of his posterity became extinct in Martin Gottlieb Luther, who was a counsellor at law, and died at Dresden in 1759. Against his will his adherents styled themselves Lutherans; against his will they engaged in a war which broke out immediately after his death and desolated Germany. As long as he lived Luther was for peace, and he succeeded in maintaining it; he regarded it as impious to seek to establish the cause of God by force; and in fact during thirty years of his life the principles of the Reformation gained a firmer footing and were more widely propagated by his unshaken faith and unwearied endeavours than by all the wars and treaties and councils since.

His German writings, in sixty-seven volumes, have been published at Erlangen (1826–57). Five different collections of his writings were published earlier, of which the most complete is that by Walch (twenty-four volumes, 4to). There is a Life of Luther, by Melanchthon; of modern accounts of his life may be mentioned those by Michelet and by Meurer (Dresden, 1851–52). See also Merle D'Aubigné's History of the Reformation, and Dr. Tulloch's Leaders of the Reformation; also, Robertson's Charles V., and Mosheim's Ecclesiastical History.

LUTHERANS, the name applied by Eck, when he published the bull against Luther, to all who took part against the pope, and which was afterwards adopted by Protestants themselves to designate those who took part with Luther against the Swiss reformers, particularly in the controversies regarding the Lord's supper. The term is now applied to one of the great sections into which the continental Protestant Church is divided, the other being known as the Reformed. The doctrinal system of the Lutheran Church is contained in the Augsburg Confession, presented in 1530 to Charles V. at that town, by the reformers as a statement of their belief; in the Schmalkald Articles, framed by Luther at a meeting of princes in that place; in the Forma Concordiæ, drawn up by six Lutheran doctors at Berg, in 1574, and the two catechisms of Luther. The fundamental doctrine of the church is that we are justified before God, not through any merits of our own, but through faith in His Son. In the eucharist it is generally believed that Luther held most strongly the real presence of the body and blood of Christ,

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though denying transubstantiation. His belief in this matter has been qualified by the name of consubstantiation. Among his followers in later times opinion on this subject has considerably varied, and has long been a fruitful source of controversy both in the church itself and between it and other Protestant bodies. The history of Lutheranism from the Reformation to the present day is a somewhat stormy one. Extending in the time of its founder over the greater part of Germany, and becoming the established religion of Sweden and Norway in 1527, and in Denmark in 1539, it has since made no considerable addition, or suffered any important diminution of its territory. During Luther's lifetime the state of the church was comparatively quiet, but when on his death his position was filled by the gentle Melanchthon it was torn by internal dissension. First arose the contest about Adiaphora, or things indifferent, in 1548; followed by the dispute between Georgius Major and Amsdorf on the necessity of good works, in 1552; and the controversy called the Synergistic, that is, concerning the concurrence of the human will, in which the opinions of Melanchthon were attacked by Flacius, and defended by Strigelius. It was as an attempt to allay these dissensions that the Forma Concordiæ was drawn up, but it turned out to be more fruitful of strife than peace. In the seventeenth century attempts were made at union with the Anglican Church and the Reformed French Calvinists. We can only allude to the tumult resulting from the project of Calixtus to combine the different Protestant systems, which gained the name of Syncretism (1639), and those of the Pietists of Leipzig, which, originating in a laudable attempt of Spener to promote a spirit of piety, ended in fanaticism and disorder. In more recent times the Lutheran clergy, abandoning strict adherence to their symbolical books, have allowed themselves a considerable breadth of opinion; but in this again there has been, especially among that section of the church known as the Old Lutherans, a strong reaction, many having zealously sought to revive the teaching of the original founder. Among the most eminent divines connected with this church we may mention the historians Mosheim, Neander, and Gieseler; the commentators Tholuck, Stier, and Hengstenberg; the theologians Delitzsch, Dorner, &c.

LUTIDINE (C_7H_9N), a base, the third of the pyridine series, discovered by Dr. Anderson in Dippel's oil. It is a colourless, limpid, oily fluid, with a peculiar odour and strong alkaline reaction, which boils at 309° Fahr. It dissolves in water, but more readily in cold than in hot. It combines with the acids and forms a large number both of single and double crystalline salts. A body identical in composition with lutidine, but differing from it in almost every other respect, is found among the products of the destructive distillation of cinchonine.

LUTON, a market town and municipal borough of England, county of Bedford, situate on the river Lea. The Midland Railway Company has a large station here, and the Great Northern a station on a branch line from Hatfield to Dunstable. The town has a town-hall, corn exchange, and market-house, and two spacious straw-plait halls, a cottage hospital, a people's park, three cemeteries, a large ancient and handsome parish church (St. Mary's), restored in 1865, besides other churches and a number of chapels. There are extensive manufactories for straw hats and bonnets, Luton being the principal seat of that manufacture; and large numbers of felt hats are also made. There are also large brass and iron foundries, breweries, large gas-works, and extensive water-works. The town was incorporated by royal charter in February, 1876.

LÜTTRINGHAUSEN, a town of Rhenish Prussia, in the government of Düsseldorf, and 18 miles south-east of the city of that name. There are extensive manufactures of woollen, linen, and cotton stuffs; iron and steel ware, particularly scythes. Pop. 9659.

LÜTZEN, a small town of Prussian Saxony, in the government of Merseburg, and 9 miles south-east of the city of that name, situated on the Elster River Canal. Pop. 3134. It derives all its interest from the two battles fought in its neighbourhood. The first took place on the 16th November, 1632, between the Swedes under Gustavus Adolphus, and the imperialists under Wallenstein. The Swedish monarch, who had advanced into Bavaria, being recalled from his designs of conquest there by the ravages of Wallenstein in Saxony, joined his forces with those of Bernard, Duke of Saxe-Weimar, and attacked the Austrians in their strongly entrenched position in the plain of Lützen. The issue of the battle was long doubtful, but the valour and discipline of the Swedes at last decided it; it, however, cost them the life of their great warrior king. About a mile from the town a square block of granite, called the Schwedenstein (the Swedes' stone), marks the place where Gustavus fell. The imperialists on their part had to mourn the loss of Count Pappenheim, their best officer under Wallenstein, and had to leave behind them all their artillery. About 9000 men in all were killed or severely wounded. The second battle was fought May 2, 1813, somewhat further south, at Gross-Görschen. It was the first important conflict between the allied Russian and Prussian armies and the French under Napoleon in that decisive campaign. The French numbered 115,000 while the allies had only 70,000. In spite of the reckless bravery of the Prussian volunteers under Blücher, Napoleon maintained his position, though at a loss of 12,000 men, against 10,000 of the allies, killed and wounded. Owing to Napoleon's want of cavalry, the retreat of the enemy was conducted in good order, without the loss of guns or prisoners.

LUXATION, in surgery, is the removal of a bone out of its place or articulation, so as to impede or destroy its proper motion or office; hence luxations are peculiar to such bones as have movable joints.

LUXEMBOURG, François Henri de Montmorency-Bouteville, Duke of, Marshal of France, was born in 1628. He was the posthumous son of the Count de Bouteville, who was beheaded in the reign of Louis XIII. for fighting a duel. He served when young under the Prince of Condé; in 1662 he was made a duke and peer of France; and in 1667 a lieutenant-general. In 1672 he commanded during the invasion of Holland; and having gained the battle of Senef in 1674, he was created a marshal of France. In the war of France against England, Holland, Spain, and Germany he won the three great battles of Fleurus (July 1, 1690), Steinkirchen, and Neerwinden (June 29, 1693). He died in 1695.

LUXEMBOURG, Palace of, one of the most magnificent palaces in Paris, built in imitation of the Pitti Palace at Florence, completed in 1620, after four years' labour, by Jacques Debrosse, for Marie de Médicis, widow of Henry IV., on the site of the hotel of the Duke d'Épinay-Luxembourg, and successively inhabited by Mademoiselle de Montpensier, the Duchess de Guise, the Duchess of Brunswick, and Mademoiselle d'Orleans. Louis XVI. gave it to Monsieur, his brother; during the revolution it was converted into a prison, in which Danton, Camille Desmoulins, and others were confined. Later on it became the prison of Ney, who was shot at the south-east end of the gardens. It was partially blown up in 1871 by the Communards. The rooms contain beautiful specimens of painting and statuary.

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LUXEMBURG, or LUXEMBOURG, a province of Belgium, bounded north by Liége, east by the Duchy of Luxemburg, south by France, and west by the province of Namur; length, north to south, 67 miles; breadth, 37 miles. Area, 1705 square miles. It is elevated and mountainous; highest summits not over 2000 feet; and extensively covered with forests of excellent oak, &c.; a branch of the Ardennes traversing it south-west to north-east, and forming the water-shed between the basins of the Meuse and the Moselle. The soil of the lower valleys is tolerably fertile; but, with this exception, is generally a thin, sterile gravel, or hungry clay. The mountain pastures, however, are excellent, and rear great numbers of sheep, horned cattle, and horses. Iron is the only valuable ore. The chief manufactures, in addition to iron, are leather and earthenware; and the chief article of trade, after wood, is cattle. Pop. 209,118, the large majority of whom speak French or Walloon.

LUXEMBURG, GRAND-DUCHY OF, a territory belonging to the Dutch monarchy, bounded north and east by Rhenish Prussia, south by France, and west by Belgium; greatest length, north to south, 55 miles; greatest breadth, 34 miles; area, 998 square miles. It forms part of the plateau of the Ardennes, and has a rugged and mountainous surface, covered in many parts with heaths and morasses, though in general well wooded. Its drainage belongs almost entirely to the basin of the Moselle. Agriculture is limited in extent by the nature of the surface, but the pastures rear great numbers of cattle, sheep, and horses. The last, in particular, have long been in high repute for light cavalry, and are largely exported. Iron-ore, iron, and timber are also exported. The inhabitants are mostly of German origin, but French is the language of the educated classes and of business. The people are for the most part zealous Roman Catholics. Pop. 209,570. Luxemburg, in early times, was much more extensive than at present, and, though forming part of Germany, was ruled by its own princes, who at the same time were sovereigns of the state of Brandenburg. It was first governed by counts. In 1354 it was erected into a duchy by Charles IV., and in 1443 came by marriage to Philip of Burgundy, and through him to the house of Spain. By the Peace of the Pyrenees in 1659 part of it was ceded to the French, and took the name of French Luxemburg; but in 1714 it all merged in the house of Austria, and remained with it till the successes of the French revolutionary armies incorporated it with the French Empire. In 1814 it was converted into a grand-duchy and given to the King of Holland, who possessed it, in common with Holland and Belgium, till 1830, when, in consequence of the revolution of the latter, part of it became a Belgian province. The remainder, continuing with the Dutch, forms the present grand-duchy. Up to 1866 it was a member of the Germanic Confederation, and it still has an administration distinct from that of Holland. See next article.

LUXEMBURG, the capital of the above grand-duchy, recently one of the fortresses of the German Confederation, 117 miles south-east of Brussels, and 34 miles north of Metz. Its natural position is so strong, and the different powers into whose hands it successively fell did so much to extend and improve its means of defence, that Carnot pronounced it to be the strongest place in Europe after Gibraltar. From 1839 till 1866 it was garrisoned for the Germanic Confederation by Prussian troops, but in accordance with the Treaty of London (1867) the fortifications were dismantled, the Prussians withdrew their troops, and the neutrality of the duchy was guaranteed by Britain, Austria, Prussia, Russia, and France. It is divided into a low and a high town. The former lies along the banks of the Alzette. The latter stands 200 feet higher, on a steep and scarped rock. The whole town is well built; and contains three good public squares; town-houses, old and new; the government-house, town library; two old and ruinous monasteries of the Dominicans and Franciscans, and the old abbey cathedral, an athenæum, a Roman Catholic seminary for priests, a normal and several elementary schools. It has manufactures of wax, several distilleries and breweries, tanneries, dye-works, &c.; and a considerable trade. Luxemburg is the see of a bishop; and during part of the year the residence of the leading families of the duchy. Its neighbourhood abounds with fine promenades. Pop. (1880), 16,679.

LUXOR, a village of Upper Egypt, on the right bank of the Nile, containing splendid ruins of Thebes, the site of which it occupies. See THEBES.

LUYNES, CHARLES D'ALBERT, DUKE DE, favourite and premier of Louis XIII. and Constable of France, born in 1578, was descended from a noble Florentine family (Alberti) which had been banished from Florence. Having become one of the pages of Henry IV., he was the playmate of the dauphin, whose favour he soon won by consulting all his caprices. When Louis ascended the throne he appointed Luynes his grand-falconer, and Marshal D'Ancre, who was all-powerful at court, showing some jealousy of his influence, the favourite soon effected his disgrace. The marshal was assassinated, and Luynes obtained a grant of all his immense estates, and succeeded to all his places and charges (1617). In 1619 his estate of Maillé was erected into a duchy under the title of Luynes. He next supplanted Marie de Médicis, mother of the king, whom he caused to be exiled; and the whole administration was now in his hands. In 1621 the dignity of Constable of France was revived for him. Though the feeble king often complained of his cupidity and arrogance, though the whole court was intriguing against him, and the nation indignantly called for his disgrace, Luynes died in 1621, without having experienced any visible loss of favour or influence.

LUZON, or LUÇON, an island, Indian Archipelago, the largest of the Philippines. It lies to the north of the main group; is of an elongated and very irregular form, consisting of a main portion or body running north and south, with another portion connected with the northern portion by an isthmus, and extending south-east. The coast is on all sides deeply indented, especially on the west. The chief bays are Lingayan, Manilla, and Ghinayanzan on the west, Lagonoy and San Miguel on the east. The area is estimated at 57,505 square miles. Its surface is much diversified. Two great mountain chains with eminences reaching 7000 feet, the Sierra Madre and Cordillera de Caravallos, run north and south over the northern portion of the island, traverse the isthmus, and terminate towards the east and south-east coasts in a series of lofty isolated heights. There are several lakes noted for the beauty of the scenery, and several rivers in the island, two of which are navigable. Owing to the general fertility of the soil, the abundance of moisture, and a tropical temperature the vegetation of Luzon is almost unsurpassed in luxuriance. Even the loftiest heights are crowned with gigantic forests, while the plains and valleys are covered with the richest verdure, or occupied by the most abundant cultivated crops. Among these the first place is due to rice, which is extensively grown both on the plains and on the hills, and yields most productive returns; not only furnishing the chief article of food to the inhabitants, but leaving a large surplus for export, chiefly to China. Next

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in importance to rice is the sugar-cane, which is grown to a very large extent, and produces sugar of excellent quality. Other vegetable products of importance are the Abaca or Manilla hemp, a kind of banana, valuable for its fibres, which serve the purpose of hemp; various species of palm, cotton, coffee, cinnamon, maize, and particularly tobacco, the cultivation of which, though somewhat obstructed by being made a government monopoly, has long been extensive, and continues to increase. Animals suited for domestic purposes abound. The ox has been acclimatized, the buffalo runs wild, and has also been domesticated. Monkeys are numerous. Gold and iron are abundant. The manufactures of the island include cotton and silk tissues, cordage, tobacco, leather, wood and ivory carvings, mats, &c. Great skill is also displayed in building boats, canoes, and other large vessels. The inhabitants form a considerable variety of mixed races, among which the Negritos, many of whom still live in a savage state, and independent of Spanish authority, have the best title to be considered aborigines. The other principal races are Tagals or pure Indians, apparently of Malay origin, and mixed Indians, formed by intermixtures with Chinese, Japanese, and Negritos. The capital is Manilla. Pop. about 3,000,000.

LYCANTHROPY (from the Greek *lukos*, a wolf, and *anthropos*, a man), as defined by Cotgrave, 'a frenzie or melancholie, which causeth the patient (who thinks he is turned woolf) to flee all company, and hide himself in dens and caverns.' Herodotus, with great naïveté, tells us that when he was in Scythia he heard of a people which once a year changed themselves into wolves, and then resumed their original shape; 'but,' adds he, 'they cannot make me believe such tales, although they not only tell them, but swear to them.' But the lycanthropes of the middle ages, or *loups-garous*, as they were called by the French, were sorcerers, who during their wolfhood had a most cannibal appetite for human flesh. The Germans called them *Währwölfe*. Many marvellous stories are told by the writers of the middle ages of these wolf-men or *loups-garous*, and numerous authentic narratives remain of victims committed to the flames for this imaginary crime, often on their own confessions.

LYCEUM, an academy at Athens in which Aristotle explained his philosophy. In modern times the name of *lyceum* has been given to the schools intended to prepare young men for the universities.

LYCH-GATE. See LICH-GATE.

LYCHNIS, a genus of plants belonging to the natural order Caryophyllaceæ, and comprising several species well known in Britain. They have a five-toothed naked calyx, five clawed petals, ten stamens, and five styles, with flowers generally in terminal corymbs. Ragged Robin (*L. Flos cuculi*) is common in damp meadows in this country, and has a pretty flower with rose-coloured petals; White Campion (*L. respertina*) is common about hedgerows, edges of plantations, &c.; Red Campion (*L. diurna*) also prefers such localities; while the Corn-cockle (*L. Githago*, or *Agrostemma Githago*) is found blossoming among the growing corn. Many foreign species are cultivated in gardens, among which may be mentioned the Scarlet Lychnis (*L. Chalcedonica*).

LYCIA, an ancient maritime province of Asia Minor, bounded by Caria on the west, Pamphylia on the east, and Pisidia on the north. Its fertility and populousness are attested by the twenty-seven cities mentioned by Pliny, which formed a confederated republic, with a congress which regulated the public concerns, and a president called the *Lyciarch*. Little is known of the early history and geography of this country. It was colonized by the Greeks at a very early period, and its historical inhabitants were Greeks, though with a mixture of aboriginal blood. They and the Cilicians were the only people west of the Halys whom Crœsus did not conquer, and they were the last who held out against the Persians. See Fellows' Account of Discoveries in Lycia (1841).

LYCOPHRON, born at Chalcis in Eubœa, a Grecian grammarian, and the author of several tragedies, lived at Alexandria, 280 years B.C., under Ptolemy Philadelphus, whose favour he won by the invention of anagrams. He is said to have died of a wound inflicted by the arrow of an antagonist with whom he was contending on the merits of the ancient poets. Of all his writings there remains but one tragedy, Cassandra (Alexandra), which is written in iambics. It has no pretensions to poetical merit, and is but a cumbrous store of learning and obscure allusions. It is, properly speaking, a continued soliloquy, in which Cassandra predicts the fall of Troy, and the fate of all the heroes and heroines who shared its ruin. It affords some information of value respecting antiquities and mythology.

LYCOPODIACEÆ, or CLUB-MOSSES, a natural order of acrogenous or cryptogamous plants inhabiting all parts of the world, but abounding chiefly in warm, moist, insular climates. They are intermediate in their general appearance between the mosses and the ferns, and are in some respects allied to the Coniferæ. They are furnished with a branched, often spreading and creeping stem, and numerous small imbricated leaves. They are propagated by spores formed in two-valved cases, axillary to the upper leaves. There are six genera and about 200 species. The only British genus is *Lycopodium*, of which six species are natives of Britain. The most abundant in Britain and also on the Continent is the common Club-moss (*Lycopodium clavatum*), which creeps upon the ground in heathy tracts with long branching stems. *L. rubrum* is a violent cathartic, and has been used successfully in Spanish America in cases of elephantiasis. *L. clavatum* and *selago* excite vomiting. The yellow powder contained in the spore-cases of all the species is very inflammable, and is employed in the manufacture of fireworks or theatrical lightning. It is also employed to cover pills, so as to prevent them being acted upon by moisture, and is known in England under the name of lycopode or vegetable brimstone, and in Germany as *Blitzmehl* or *Hexenmehl* (lightning meal or witches' meal). Many of the species are prized for their beauty, and are cultivated in hot-houses or fern-cases, where they thrive well.

LYCURGUS, the Spartan lawgiver, supposed to have flourished in the latter half of the ninth century B.C., was, according to the commonly received traditions, the youngest son of the Spartan king Eunomus. His eldest brother, Polydectes, succeeded his father in the government, but died soon after, leaving his queen pregnant. This ambitious woman proposed to Lycurgus to destroy her child if he would share the throne with her. He pretended to consent, but when she gave birth to a son, Charilaus, he publicly proclaimed him king, and became his guardian. After a wise and prosperous rule of several years, being suspected of ambitious designs by the queen and courtiers, or being desirous of examining and comparing the political constitutions of other lands, Lycurgus left Sparta. In the course of his travels he is said to have visited Crete, Ionia (where he became acquainted with Homer, or at all events with his poems), and Egypt, and to have penetrated even as far as India. His return to Sparta was hailed by all parties. The country had sunk into a state of anarchy and licentiousness, and he was considered as the man who alone could cure the growing

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diseases of the state. The entire community requested him to draw up a constitution for them. He undertook the task. The whole constitution, military and civil, was completely remodelled; the highest position in the state was to be shared by two kings, whose powers were counterbalanced by a senate (*gerousia*) of twenty-eight persons. The people, or rather the Spartans proper, obtained a voice in public affairs. The native race or Lacedæmonians were confined to the pursuits of trade, commerce, and agriculture; the Helots or slaves to all those menial employments which a freemen would consider as a disgrace to occupy, while the Spartans became the king's counsellors and warriors of the state. Lycurgus also introduced a redistribution of property, which was not effected, however, without considerable opposition and tumult. After he had obtained from the god at Delphi an approving oracle for his institutions, he exacted a promise from his countrymen not to make any alterations in the laws before his return from a journey he was about to make. He then left Sparta, determined to finish his life in voluntary exile, in order that the Spartans might be bound by their oath to preserve his constitution inviolate for ever. The time and place of his death are unknown. He was honoured as a god at Sparta with a temple, and yearly sacrifices were offered to him down to the latest ages.—Such are the commonly received traditions respecting Lycurgus, which, however, must be received with much caution. The utmost that is assumed by modern historians is that such a personage may have once existed, who, at some critical juncture in Spartan affairs, may have been called upon to draw up a code of laws for the better government of the state. A great number of the laws accredited to him are known to have been common to the whole Doric stock from the earliest period. See SPARTA.

LYDIA (in ancient times *Mœonia*), a large and fertile country of Asia Minor. The Ionians inhabited the part on the coast of the Ionian Sea. Towards the south it was separated from Caria by the Mæander (now Meinder); towards the east it was bounded by Phrygia, and on the north by Mysia. It was in early times a celebrated kingdom, divided from Persia by the river Halys (now Kizil Irmak). Its original inhabitants are said to have been a people called Mœonians, either of Semitic or of Indo-Pelasgic origin, it is unknown which. This race was subdued by the Lydians, a Carian tribe. It attained its highest prosperity under the Mermnadæ dynasty, beginning with the half mythological Gyges (716 B.C.), and ending with Crœsus (546 B.C.), who was conquered by the Persians under Cyrus. The people were the richest, and perhaps also the most effeminate and luxurious in all Asia. The Lydians delighted in luxurious garments, costly carpets, precious ointments, and exquisite viands; and a kind of Grecian music, which was said to bear the character of effeminacy, was called the *Lydian*. They also laid out beautiful gardens. Their example corrupted also the Ionians. The wealth of the Lydians, however, was probably, in a great measure, confined to the kings and chief men. These could fill their coffers with the gold washed down by the Hermus (now Sarabat) and the Pactolus, and that obtained from the mines; and they procured all the necessities of life by the labour of their slaves. The Lydians are said to have been the first to coin money, and to establish inns; they are credited with the invention of certain musical instruments, the art of dyeing wool (which was afterwards carried to such perfection in Miletus), also the art of melting and working ore. At Sardis, the capital of the country, the Grecians, Phrygians, and even the nomadic tribes bartered their goods. There was here a great market for the slave-trade, which furnished the harems of Persia with eunuchs.

LYENCEPHALA (Greek *luo*, I loose; *egkephalos*, brain), the lowest division of the class Mammalia according to Owen, including the Ornithorhynchus, kangaroos, opossums, &c., as representing the two orders Monotremata (which see), and Marsupialia (which see). These forms are lyencephalous, in that the brain exhibits a lowness of structure. The surfaces of the cerebral hemispheres, or true brain, are generally destitute of folds, and the true brain does not cover the cerebellum or lesser brain, or the olfactory lobes; whilst part of the optic lobes are also left uncovered. The hemispheres of the true brain in this division, according to Owen, are not connected by a broad band or *corpus callosum;* the existence of this latter structure, however, according to Huxley and Flower, being affirmed in these animals. See also LISSENCEPHALA.

LYLY, or LILLY, JOHN. See LILLY.

LYME-REGIS, a municipal borough, seaport, and market town, England, in the county of Dorset, 22 miles west of Dorchester, intersected by the Lyme, and situated amidst scenery of the most picturesque description. The harbour or Cobb, which is formed by two piers, and affords the only safe shelter for vessels between the Portland Roads and the Start Point, is about ¼ mile from the town. Here are bonded stores and a custom-house, but very little trade is done. Fishing and sail-making afford some employment to the inhabitants. Lyme-Regis, however, has become of late years a fashionable watering-place, and baths, assembly-rooms, libraries, and other conveniences have been erected. Pop 2047.

LYMINGTON, a seaport town, England, in the county of Hants, on the Boldre, at its mouth in the Solent, 12 miles south-west of Southampton. It is a station on a short branch of the London and South-Western Railway. It is well built, and having both a mild climate and excellent accommodation attracts numerous visitors for sea-bathing. Among the places of worship is a handsome church. The place has some celebrity for its yacht building. The trade of the port is confined to coasting vessels. It sends one member to Parliament. Pop. mun. bor. 2410; parl. bor. 5468.

LYMPH. The fluid resulting primarily from the assimilation of food, and also obtained from the blood and tissues, and which is contained within a system of vessels ramifying throughout the bodies of Vertebrates. To these vessels the names of *lymphatics* and *lacteals* are applied. The clearest and simplest view which may be taken of the nature and functions of the lymphatic system of vessels is that of considering them as forming a connecting link between the digestive and blood or circulatory systems; or in other words, to view these vessels as the media through which matters are *absorbed* from the alimentary canal on the one hand, and from the blood and tissues on the other. The matters so absorbed are elaborated and converted in the *lymphatic glands* into *lymph*, a fluid which may be considered as presenting us with the initial and essential features of the more highly elaborated blood. Hence it is that the lymphatic system, concerned in absorption, receives the general and comprehensive term of *absorbent system*. This system of vessels is peculiar to the Vertebrata. In none of the Invertebrate groups do we find such a defined set of vessels; and in the lower animals, matters formed from the digestion of food simply pass from the digestive system into the blood system directly, and without the intervention of any absorbent vessels. Most frequently in Invertebrates the products of digestion pass from the alimentary tract without further elabo-

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ration into the great venous *sinuses*, or spaces between the organs and tissues of the body. These sinuses form irregular channels leading to the current of the circulation, generally through the respiratory or breathing organs, where those exist. It may be premature, or even incorrect to assert that the products of digestion undergo in these sinuses no elaboration whatever. On the contrary we are entitled to believe, and from analogy to maintain, that in these venous channels the *chyle* or digestive product will be mixed with, and will assume the characters of the blood itself. But in Vertebrates we find that this further assimilation and elaborative process is specialized and performed by the lymphatic or absorbent vessels; the presence of which thus constitutes a distinctive character of the highest sub-kingdom of animals. Through this system, therefore, the continual loss which the blood and body suffer through the efforts of living and working is made good. Fresh supplies of nutritive matter are thus poured from the lymphatic system into the current of the circulation, and this new material is derived not only from the digestion of food but from the tissues themselves. The blood-vessels may be deemed absorptive agents, in that they return from the tissues to which they are distributed material which may be either excreted from the body by the lungs, or made to subserve nutrition by being again elaborated and incorporated with the current of the blood. In this view the true lymphatic or absorbent vessels, and the blood-vessels themselves, become perfectly correlated in nature and in function; and this view may serve to show how difficult or even impossible it is to determine or say where the function of the circulation ends, or where that of absorption begins. The one process insensibly merges into and accompanies the other. The lymph as it exists in the lymphatic vessels is a colourless, transparent fluid, destitute of smell, and like the blood is alkaline in its nature. It is said to possess a saline taste. When viewed through the microscope lymph is seen to consist of a clear fluid or *plasma*, in which colourless *corpuscles* exist. Probably only the lymph which has passed through the *lymphatic glands*, or that which has undergone elaboration in the absorbent vessels, contains corpuscles; the fluid contained in the smaller trunks, and those situated towards the extremities of the body, being destitute of these bodies. The lymph resembles blood in that it is an alkaline fluid, and in that it coagulates or clots by the separation of the fibrinous part of the plasma; but lymph differs from the blood in that its corpuscles are all colourless, and because its solid matters are present in very small proportion—these amounting to about five per cent. of its weight only. Blood contains about eight per cent. of solid matters; and if it were diluted with water, and had no coloured or red corpuscles, it would resemble lymph in its essential features. The lymph corpuscles may, indeed, be viewed as the source not only of the white globules, but also of the red corpuscles of the blood. Since when passed into the current of the blood-circulation they then, and by a simple change of medium, become the white corpuscles of the blood, and when partially disintegrated or altered they give origin to the red corpuscles of the latter fluid. The blood may be regarded as being recruited by the absorbent system from two points of supply. Thus the lacteals or lymphatic vessels of the intestines (which see), absorb the chyle or product of digestion directly from the alimentary canal; and pour the chyle, already existing as rudimental blood, into the current of the circulation. Then secondly, from the tissues, and from all parts of the body generally, the ordinary lymphatic or absorbent vessels bring the lymph, which becomes further elaborated the lymphatic glands, and pour it into the current of the blood. In both cases, the actual termination of the lymphatic vessels is in the large veins in the neighbourhood of the heart. The lymphatic circulation may thus be regarded as corresponding in its general direction to the course of the venous blood. Entering thus the venous circulation, the absorbent products are sent through the heart to the lungs, where, through the process of respiration, they undergo the final degree of elaboration necessary to render them identical with the blood itself. The chyle absorbed by the lacteal vessels from the digestive tract resembles lymph in its essential characters and composition; the chyle containing, however, a greater amount of fatty matters. During fasting, or in the intervals of digestion, the fluid contained in the lacteal vessels is clear, and resembles ordinary lymph; but during digestion it becomes of a milk-like appearance, and is then known as chyle. It has a neutral, or if anything a slightly alkaline reaction. The white colour is on microscopic examination seen to be due to the presence in the fluid of immense numbers of minute particles of fatty or oily matter. Those particles average the $\frac{1}{10000}$th of an inch in diameter, and they collectively constitute the *molecular basis* of the chyle. As the chyle passes upwards and through the lacteal or lymphatic glands of the mesentery towards the circulation, it becomes further elaborated. The oily particles decrease in number, and the characteristic white corpuscles seen in the lymph become developed within it; the corpuscles increasing in number as the chyle advances nearer the current of the circulation. It thus assumes more and more of the characters of ordinary lymph, save for its containing, as already remarked, more fatty matters. And then finally we observe the lymph and chyle to be mixed together in the *thoracic duct*, from which vessel these fluids are poured into the circulation, as a uniform and single fluid destined to repair and recruit the great nutritive stream flowing through the blood-vessels. The lymphatic or absorbent vessels themselves resemble small veins in general structure. They are provided like the veins with valves, permitting the flow of lymph in one direction only, namely towards the large veins near the heart, into which the lymph is poured. The most minute lymphatics or *lymph-capillaries* commence in the finest tissues throughout the body; the only structures in which the existence of lymphatic vessels has not been ascertained being the non-vascular parts —such as the hair, nails, and outer skin—and the *placenta* or after-birth, and *membranes* of the *ovum* or embryo. The capillary lymphatics take origin in close mesh-work like masses, or in the spaces or *lacunæ* which exist between the parts and structures of which the various organs and tissues are composed. Those lymph-capillaries which commence in the superficial tissues of the body begin in a capillary net-work; whilst the lymphatics of organs and more definite structures, arise from the lacunar spaces which exist among the minute or constituent parts of the tissues composing these organs. In either case, the primary lymph-capillary or lymph-channel is lined by epithelial cells, this arrangement recalling the similar structure of the blood-capillaries, or those in which arteries end and veins begin. The lacteals of the intestines take origin within the villi of the intestines (which see), in a looped arrangement, or in a net-work; the commencement of these vessels being thus of the nature of a closed or cœcal tube. In the lower animals (for example sheep), the net-work arrangement of the lacteals in the villi is best seen; those of man take origin in a simple looped fashion. The larger lymphatics closely resemble ordinary veins in structure, three coats or tissues being discernible in their structure—an outer fibro-elastic coat; a middle

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layer of fibro-cellular tissue with muscular fibres; and an inner coat of longitudinal fibres, which is lined by epithelial cells. The valves are generally placed in pairs, and open only towards the heart. In the smaller lymphatics the valves are arranged in a close series, this conformation giving the vessels a knotted appearance when filled with lymph. The flow of lymph towards the heart is induced partly by the general pressure and action of the muscles of the body, the valvular structure aiding its propulsion as in the veins; and to this, as well as to the absorptive power, must be added the action of the contractile muscular fibres of the lymph-vessels themselves. The mode in which the minute lymph-vessels and blood-vessels communicate, and through which the fluid parts of the blood find their way into the lymph-capillaries, was long made a subject of much discussion among physiologists; but we now know that the fluid part of the blood readily transudes through the capillary walls into the surrounding spaces, whilst in these spaces the lymphatics have already been seen to commence. And so far as the migration of the white corpuscles of the blood is concerned, the fact of such migration has been clearly stated and proved—first by Waller in 1846, and afterwards by Cohnheim in 1867. Thus the even solid parts of the blood—the white and red corpuscles of that fluid—can pass through the apparently solid capillary wall into the surrounding tissues. And the explanation of this seemingly strange phenomenon rests on the fact that the capillary wall is not a solid unyielding structure, but a living contractile tissue, which can be readily conceived to allow a similarly soft living particle to pass through the membrane, and to close up again without any aperture being perceptible. Recklinghausen's observations have led to the belief, that definite openings or *stomata* exist in various parts of the body, through which communication between closed cavities (such as the cavity of the *peritoneum* and of the *pleura*) and the lymphatic-capillaries may take place. These stomata have thus been supposed to admit milk injected into the peritoneal cavity into the lymphatics of the diaphragm or midriff; and in the pleura, openings have been alleged to place the cavities of that membrane in similar communication with the lymphatic vessels. In this view it has been suggested and argued, that the large serous cavities are to be viewed as merely the enormous dilatations of the lymph-capillaries themselves.

The lymphatic and lacteal vessels sooner or later in their course run into and emerge from bodies generally of comparatively small size, and to which the name of *lymphatic glands* has been given. These glands are highly important structures, for, as already remarked, it is only after passing through them that the lymph contains lymph-corpuscles in any abundance. They are thus concerned with the elaboration of the lymph fluid. In size they may be stated to average that of a small almond, and they are generally arranged in groups. Each gland is entered by a number of vessels bringing lymph to it, these being known as the *afferent vessels*. The vessels which leave the gland and carry away the lymph from it are in contradistinction known as *efferent vessels*. In structure a lymphatic gland presents externally an envelope of connective tissue; and from this outer covering we find a fibrous framework of processes (*trabeculæ*), prolonged into the interior of the gland. This fibrous framework or *stroma* occupies the interior, and exhibits at the surface or *cortical* part of the structure larger spaces or *alveoli;* whilst in the centre, or *medullary* part, the trabeculæ form a network of finer kind. The essential gland-structure is contained within the stroma or network structure; and this glandular structure exists at the surface of the gland as a series of nodules occupying the meshes, and as an arrangement of rounded cords in the more central portions of the organ. And interlacing with the preceding structures, and forming a net-work within the other portions of the gland, a tissue known as *retiform tissue* is found. The meshes of this latter tissue, and of the stroma also, are crowded with lymph-corpuscles, especially in the centre of the meshes, a clear space being left in the outer portion of the alveoli and other interspaces. The free space throughout the gland unoccupied by the corpuscles, and which contains retiform tissue only, is known as the *lymph-channel* or *lymph-path*. As implied by the term, the lymph coming to and sent from the gland passes through this channel; the afferent vessels entering the gland at its outer or cortical portion, and opening into the alveoli. The epithelial lining alone, of the various coats of the lymph-vessels, is continued into the lymph-channel, with which the afferent vessels thus become continuous, and into which their contents are poured. Whilst the efferent vessels, or those leaving the gland, take origin from the same lymph-path, its epithelial lining becoming continued onwards to form that of the efferent vessel. Within the stroma of the gland, and also within the softer portions or pulp contained in the meshes of the fibrous net-work, minute blood-vessels are distributed. The changes which occur in the lymph as it passes through the glands have been already noted. Thus corpuscles are added to it in the glands, whilst in the composition of its fluid portion it undergoes further elaboration. The lymphatic trunks of the greater part of the body finally pour their contents into the *thoracic duct*, a tube about the size of an average crow-quill, which opens into the current of the blood at the point of junction of the *internal jugular* and *subclavian* veins of the *left* side of the body. On the *right* side of the body a smaller duct is found, which receives the contents of the lymphatics of the *right* half of the chest, the right arm, and right side of the head and neck; and this smaller lymphatic channel—or *right lymphatic duct* as it has been named—opens into the angle formed by the junction of the *right* jugular and subclavian veins, similarly to its larger neighbour of the left side. The thoracic duct begins in the upper part of the abdomen, and runs up in front of the spine to the root of the neck, where it opens into the great veins, as already described. The *receptaculum chyli*, or *cistern of the chyle*, is the dilatation at the commencement of the thoracic duct in the abdomen, which receives the contents of the lacteals or intestinal lymphatics. The orifices by which the thoracic duct and right lymphatic duct open into their respective great veins are guarded by valves, which permit the lymph to flow from the ducts into the veins, but prevent the flow of blood into the ducts.

Certain curious contractile dilatations found in fishes, reptiles, and birds, and which are apparently concerned in the propulsion of lymph and chyle, are termed *lymph-hearts*. There may be one or two pulsating sacs of this description, for example, in the tail of the eel and of other fishes. In frogs, four contractile sinuses exist, two being situated near the tail vertebræ and two in the neighbourhood of the *scapula* or shoulder-blade. And in reptiles and birds, there is generally a posterior pair of lymphatic-hearts, corresponding to the hinder pair of the frogs and toads. In birds and reptiles, however, the lymphatic-hearts or sinuses are not contractile as in the lower vertebrate forms; but notwithstanding this difference in function there is no doubt of their homology with the true pulsating lymph-hearts above noted. Into each of the pulsatile lymph-hearts several afferent lymphatic trunks open, the orifices being protected by valves, which prevent regurgitation of the lymph backwards

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into the vessels. And from each lymph-heart one or more venous trunks arise, into which the lymph is propelled by the contractions of the sac; the lymph being in this way introduced directly into the venous system, instead of being conveyed through the thoracic duct or main lymphatic channel. In the frog the anterior lymph-hearts pump the lymph into the subclavian veins, whilst the posterior hearts propel their contents into the crural vein. These lymph-hearts are invested by muscular fibres transversely striated like those of voluntary muscle generally, or like the muscle of which the heart—an involuntary muscle, however—is composed. The contractions of the lymphatic-hearts average about sixty per minute, but are comparatively feeble when compared with the movements of the true heart; nor do the lymph-hearts, where a pair of these organs exist, necessarily beat synchronously or in time with each other or with the companion pair. The innervation of the lymph-hearts further appears to be connected with a limited portion of the spinal cord, and this limited portion alone appeared to control the movements of these organs. Lastly, it may be well to remind the reader that the *spleen* (which see) is by physiologists considered to be merely a lymphatic gland of large size, since it appears to be concerned in the elaboration of the blood; and according to the most recent theories to be a place of disintegration of the red, and a manufactory of the white corpuscles of the blood. And the *thymus gland* has also been supposed to be connected with the function of blood elaboration, and thus to be associated with the lymphatic system; although confessedly this latter subject is one concerning which few trustworthy observations have yet been made. Extended researches will doubtless greatly further the views now entertained, and widen the analogies between certain of the so-called 'ductless glands,' and the true lymphatic system of glands and vessels.

LYNCEUS. See DANAÏDES.

LYNCHBURG, a town of the United States, Virginia, on James' River, 120 miles west by south of Richmond. It contains iron and brass foundries, a large cotton factory, several flour mills, and extensive tobacco manufactories, which constitute the principal employment of the place. It carries on a considerable trade, and communicates with Richmond by canal and rail. Pop. (1880), 15,959.

LYNCH-LAW, a cant name for the irregular and revengeful species of justice administered by the populace in some parts of the United States, and sometimes also employed to denote any violent or irregular taking of the law into one's own hands. It is said to have originated from the circumstance of a Virginian farmer of the name of Lynch having taken his own way of obtaining redress for a theft by catching the culprit, tying him to a tree, and flogging him. This mode of administering justice has always prevailed more or less in every country in times of great popular excitement, and is necessarily resorted to in newly settled territories, where the power of the civil government is not fully established.

LYNDHURST, JOHN SINGLETON COPLEY, BARON, an eminent lawyer and statesman, was born of Irish parentage at Boston, United States, 21st May, 1772. His father, a painter of some note, brought him to England in his early infancy, and intended to devote his son to his own art. After having studied for some time under Reynolds and Barry, however, he entered the University of Cambridge in 1791, and took his M.A. degree in 1797. He became a fellow of Trinity College, and was called to the bar at Lincoln's Inn in 1804. In 1817 he ably defended Watson and Thistlewood for high treason, and obtained their acquittal. The same year he was appointed chief-justice for Chester, and in 1818 entered Parliament as member for Yarmouth, Isle of Wight, which he soon exchanged for Ashburton. In 1819 he became solicitor-general in the Liverpool administration, and in 1827 succeeded to the post of attorney-general. Three years later he was elected along with Lord Palmerston member of Parliament for Cambridge University, and became master of the rolls. In March, 1829, he (then Sir John Copley) excited some surprise by his great speech against Catholic emancipation, which could not have been anticipated from his earlier liberal opinions. In the following April he succeeded Lord Eldon as chancellor, and was raised to the peerage. During the ministry of Earl Grey (1830–34) he held the position of chief baron of the exchequer, and displayed his rare judicial qualities in the judgment which he delivered in the celebrated case of Small *v.* Attwood. He was a formidable opponent of the reform bill, and a trusted counsellor of the king. In 1834 he was a second time chancellor, but retired with the Peel ministry next year. Lyndhurst's speeches and annual reviews of the session contributed greatly to the return to power of the Conservatives in 1841, on which occasion he was for the third time raised to the woolsack. He retired in 1846, from which time he took little part in home politics, confining his attention more to matters of foreign policy. He died in London, 12th October, 1863. For a long time he was virtually the Tory leader in the upper house.

LYNEDOCH, THOMAS GRAHAM, LORD, a distinguished British general, was the son of Thomas Graham of Balgowan, in Perthshire, and born in 1750. He married early, and for many years lived the quiet life of a country gentleman. In 1792, however, his wife died, a loss which plunged him into such intense grief that his health was seriously affected. He was recommended to travel on the Continent, and during the course of his peregrinations he visited Gibraltar, where he offered himself as a volunteer to Lord Hood, then preparing to lay siege to Toulon. His services were gladly accepted, and he distinguished himself among the foremost by his prowess. He then returned to Scotland, became lieutenant-colonel in the 90th Regiment, the first battalion of which he raised himself, and afterwards proceeded with it to Gibraltar in 1795. The monotony of this station disgusted him, and he obtained permission to join as a volunteer the Austrian army, where he served in the campaign on the Rhine, and also took part in the defence of Mantua. He continued with the imperial troops till the Treaty of Campo Formio in 1797, and he then returned to Gibraltar, from which he was shortly afterwards summoned to engage in the reduction of Malta in 1800. He joined Sir John Moore's expedition to Sweden, followed by the more eventful one to Spain, where he took a leading part in the memorable retreat to Coruña. In the expedition to Walcheren he acted as a general of division, and on his return from that disastrous locality was sent out to Spain to take command of the British and Spanish troops then besieged by the French in Cadiz. Graham's daring and energetic spirit led him to attempt to raise the siege by an attack on the French army, in which, though hampered by the imbecility of the Spanish commander La Pena, he succeeded in gaining a brilliant victory on the heights of Barossa. For his gallantry on this occasion he received the thanks of both houses of Parliament. In 1811 he joined Wellington's army, but was obliged for a time by a complaint in his eyes to proceed to England, from which he returned to the Peninsula to share the remainder of the campaign, including the battle of Vittoria and the siege of St. Sebastian. His last military undertaking was the siege in 1814 of Bergen-op-Zoom, in which, however,

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he was unsuccessful. In May of that year he was raised to the peerage with the title of Baron Lyndoch. He died in London on 18th December, 1843.

LYNN, a town of the United States, in Essex county, Massachusetts, on the north side of Massachusetts Bay, about 10 miles north-east from Boston. The site is generally flat, but a range of hills sends a spur into the town. There are some fine public buildings, including the city-hall, music-hall, Odd-fellows' hall, &c.; the churches and schools are numerous. There is a fine cemetery and a handsome monument to the soldiers that fell in the war. The town is supported mainly by the manufacture of boots and shoes, of which upwards of 15,000,000 pairs are stated to be annually made, chiefly cheap boots for women and children. About 12,000 persons are engaged in this manufacture. There are also numerous leather currying establishments. Pop. (1880), 38,274.

LYNN-REGIS, or KING'S LYNN, a seaport town, municipal and parliamentary borough of England, in the county of Norfolk, near the mouth of the Great Ouse in the Wash, and on a branch of the Great Eastern Railway, 38 miles W.N.W. of Norwich. It consists principally of three streets parallel to the Ouse, and was formerly surrounded by a bastioned wall, of which considerable portions still remain. The principal buildings are St. Margaret's, and All Saints' churches, St. Nicholas' chapel, the guildhall, athenæum, custom-house, corn-exchange, &c. The harbour is commodious, and has been much improved by the construction of two docks, the last stone of the newest (the Bentinck Dock) being laid in Oct. 1883. The trade, consisting chiefly of imports of coal, timber, linseed, &c., and exports of agricultural produce, oil-cake, wool, &c., is considerable and is rapidly increasing. It sends two members to Parliament. Pop. (1881), 18,454.

LYNX, the term applied to denote a genus of the Felidæ or cat family, distinguished from the larger members of the group chiefly by the shortness of the tail, and the presence of a pencil-like arrangement of hairs at the tips of the ears. The lynxes are indeed very closely allied to the true cats, in which, however, the ears are not provided with tufts of hairs, and the tail is elongated. They feed upon the smaller mammals and birds, and in pursuit of their prey frequently climb to the tops of tall trees. The various species have not been very clearly determined. In their distribution the lynxes occur in both Old and New Worlds, these forms appearing chiefly to inhabit the northern regions of both hemispheres. The largest species is the *Felis cervaria*, occurring in North Asia and Russia. The European Lynx (*F. lyncus*, Pl. XXIX.–XXX. figs. 10 and 11) is still found sparingly in the northern Apennines and Pyrenees. In length the European species averages 3 feet. The Caracal (*F. caracal*) is found in Southern Asia and Africa. Both the European lynx and caracal appear to have been known to the ancients; and the former is the species most commonly depicted in classical representations—as in the conquest of India by Bacchus, where the lynx is represented as harnessed to his car. Among the ancients it was also celebrated for its alleged quickness of sight, and because its urine was believed to solidify, and become converted into a precious stone. All the northern lynxes are of a grayish colour; the skin of the European species being considered more valuable if taken in winter than if obtained in summer. The caracal resembles a large fox in size, and derives its name from the black colour of the ears—the word *kara* signifying black in the Turkish language. In North America, where several kinds of lynxes occur, the Northern or Canadian Lynx (*F. Canadensis*) is the best known species. Pennant considered this lynx as identical with the Old World form; Geoffrey St. Hilaire regarded it as a distinct species; and Temminck has included the northern species of both hemispheres under the name of *F. borealis*. The Canadian lynx, however, should be deemed on ordinary grounds, such as differences in size, colour, &c., a different species from the Old World forms. Around the Hudson's Bay district it is found in great abundance; from seven thousand to nine thousand skins being annually exported. It preys chiefly on rabbits and hares, but is timid in its nature, and is never known to attack the larger quadrupeds. When brought to bay it makes little or no resistance, but merely spits and erects its back like a cat. It is easily killed by a smart blow from a stick. In length it measures about 3 feet from the tip of the nose to the end of the tail, which is about 6 inches in length, with a black tip. It is clumsy and awkward in appearance, possessing large paws, slender loins, with long thick hind-legs, terminated by the short thick tail. Its whole aspect is thus somewhat hyæna-like. It moves by bounding forward, with the back slightly arched, and lights on all-fours. It is not a swift runner, but swims well. Its flesh is eaten, and is said to resemble that of a rabbit in flavour. These lynxes breed twice yearly, and generally produce two young at a birth. The other American species are the *Felis rufa* and *F. fasciata*, both of smaller size than the Canadian lynx. The former occurs in those states bordering on the Atlantic, and in the north and west as well. The latter inhabits the borders of plains, and the woody districts in the vicinity of the Pacific Ocean.

LYON-KING-AT-ARMS, a heraldic officer in Scotland, so called from the lion-rampant, the armorial bearing of the Scottish kings. The office, which he holds immediately from the sovereign by commission under the great seal, empowers him to inspect the arms and ensigns armorial of all noblemen and gentlemen in the kingdom, to give proper arms to deserving persons, and fine those who use arms without being duly matriculated. The heralds pursuivants and messengers who act under him are all appointed by him and subject to his jurisdiction. In former times one of his duties was to carry public messages to foreign states. His regalia, worn on solemn occasions, are very sumptuous.

LYONNAIS, an ancient province in the eastern part of France, of which Lyons was the capital. It consisted of Lyonnais Proper, Beaujolais, and Forez. It now forms the departments of the Rhône and the Loire.

LYONNET, PETER, a celebrated naturalist, born in 1707 at Maestricht, graduated at Utrecht, and was for some time a counsellor at the Hague. He afterwards became secretary and Latin and French interpreter to the states of Holland. This situation occupying but little of his time he employed himself in researches into the natural history of insects and other animals, particularly such as were to be found in the vicinity of the Hague. He formed a valuable collection of shells, and was admitted into many of the principal scientific societies in Europe. His death took place January 10, 1789. His most important production is entitled Traité anatomique de la Chenille qui ronge le Bois de Saule (1760, 4to)—a work no less remarkable for originality of design than for splendour of execution. Lyonnet was distinguished for his skill as a painter and engraver, and he displayed much ingenuity in improving microscopes and other instruments used in making his observations.

LYONS (French, *Lyon;* Latin, *Lugdunum*), the second city in France, capital of the department of the Rhône, 240 miles S.S.E. of Paris, and 170 miles north of the Mediterranean. The greater part of the town is built on a tongue of land between the Saône

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the Hôtel Dieu, the Maison de la Charité, the Maison de Refuge, the Maternité, the Hôpital de la Croix-Rousse, the Hôpital de la Charité, the Hôpital de la Charité, the Hôpital de la Charité

Claudius, and Caracalla, and the celebrated general Germanicus. Pop. (1881), 376,613.

LYONS, GULF OF (ancient *Gallicus Sinus*), a bay of the Mediterranean, on the south-eastern coast of France. The principal ports on this gulf are Toulon, Marseilles, and Cette. It is called by the French writers *Golfe du Lion*, the name being derived from the agitation of its waters.

LYRE, the most ancient of all stringed instruments. The mythological tradition of the origin of the lyre is curious. After an inundation of the Nile a tortoise was left ashore among other animals; after its death its flesh decayed, and some of the tendons were dried by the sun, so as to produce a sound when touched by Thoth-Trismegistus, the Egyptian Mercury, as he was walking on shore. He immediately made an instrument in imitation of it, and thus invented the lyre. This lyre originally had but three strings. The Greeks ascribed the invention of the lyre to their Mercury (Hermes); but the Greeks also say that Hermes first used the shell of a tortoise. According to others Mercury merely improved the invention of the Egyptian. Diodorus tells us that Apollo felt so much repentance for his cruelty towards Marsyas that he tore the strings from his cithara. The muses after this invented a tone, and Orpheus, Linus, and Thamyras one each. These being added to the three-stringed Egyptian lyre, gave rise to the heptachord or seven-stringed lyre of the Greeks. The invention of the instrument has also been ascribed to each of its chief improvers. The Egyptian and Grecian lyres were at first strung with the sinews of animals. The number of the strings was at last increased to sixteen. It was played with the *plectrum* or lyre-stick of ivory or polished wood, also with the fingers. Among the Greeks the lyre was called by different names—*lyra*, *phorminx*, *chelys*, *barbitos*, *barbiton*, *cithara*. The body of the lyre was hollow, to increase the sound. Few objects are so graceful in form and susceptible of such various application in the fine arts as the lyre. As a musical instrument it has now gone out of use among the civilized nations of the West, though a rude form of it is still to be met with in the hands of the shepherds of Greece and among the negro tribes of Africa. It is the symbol of Apollo, yet other deities also bear the lyre. It was played by educated Greeks in general; and Themistocles having once declined playing when requested, he was considered a person without cultivation.

LYRIC POETRY is that species of poetry by which the poet directly expresses his emotions. The predominance of feeling in lyric poetry is what chiefly distinguishes it from dramatic poetry, in which action and character, independent of the individual emotion of the poet, predominate; and from epic poetry, of which a series of actions and characters, as contemplated and exhibited by the poet, is the characteristic. We must not suppose that every expression of feeling in verse deserves the name of a lyrical poem, although the mistake is a very common one. It is necessary that the feeling represented should be itself poetical, and not only worthy to be preserved, but accompanied by a variety of ideas, beauty of imagery, and an eloquent flow of language. One distinct feeling should predominate, giving tone to the whole; the feeling must be worthy of the subject which caused it, corresponding to the same both in degree and kind, and must be so exhibited as to give a living picture of the poet's mind, while at the same time what is merely individual and accidental must be excluded, so that the poet shall be truly the representative of his race, and awaken the sympathy of all. But this requires genius of a high order.

LYSANDER, a Spartan general, was of servile origin, or at least the son of a freeman and a woman of inferior condition. He obtained the citizenship, and soon distinguished himself as a soldier and diplomatist. In 407 B.C. he was appointed to the command of the Spartan fleet off the coasts of Asia Minor. He established his head-quarters at Ephesus, the later prosperity of which is due to his making it a focus of trade by the numbers of merchants he attracted hither. Next year he was succeeded by Callicratidas. In a short time his reputation and influence had so increased that Cyrus and the Asiatic allies of Sparta requested the Lacedæmonians to invest him a second time with the command of the fleet. This, however, was against the Spartan law, which decreed that the supreme command should not be held twice by the same person; but it was evaded by giving Aracus the nominal command, Lysander holding the real power with the title of vice-admiral (405 B.C.) In this year he defeated and captured the Athenian fleet off Ægospotamos, only nine ships under the command of Conon effecting their escape. This decisive victory put an end to the Peloponnesian war. Shortly afterwards he set sail for Athens, which he blockaded with a fleet of 180 ships, while Agis and Pausanias inclosed it with a powerful army on land. In the spring of 404 B.C. the city was starved into capitulation; the long walls and the fortifications of the Piræus were demolished; and an oligarchy, known by the name of the Thirty Tyrants, was established, which governed with terrible cruelty. Lysander then returned to Lacedæmon, where his ambitious and unscrupulous character was well understood; yet the splendour of his victories, his extraordinary liberality, and his apparent disinterestedness, gave him such an ascendency that he was in fact if not in name the sovereign of all Greece. He was excessively fond of praise, and took good care that his deeds should be sung by the greatest poets of the time. He was the first of their own countrymen to whom the Greeks erected altars, offered sacrifices as to a god, and celebrated festivals. On the death of Agis II. (397 B.C.) he secured the succession of Agesilaus in opposition to Leotychides, and was one of the thirty councillors appointed to accompany the new king in his Asian expedition. On his return to Sparta Lysander, stung by the ingratitude of Agesilaus, who thwarted his plans and refused all his demands, resolved to destroy the constitution of his country by abolishing hereditary monarchy, making the throne elective. He attempted to gain the favour of the gods to his scheme, but the Delphic and other oracles were unfavourable in spite even of his bribes. On the outbreak of the Bœotian war (394 B.C.) he commanded the Spartan forces; he marched against Haliartus, and was killed in battle under its walls.

LYSIAS, an Athenian orator, born about 458 B.C. His father Cephalus was likewise an orator, of whom Plato makes honourable mention in his Republic. Soon after his father's death Lysias, then in the fifteenth year of his age, went to Thurium, in Magna Græcia, to study philosophy and eloquence under Tisias and Nicias of Syracuse. Having settled in Thurium, he was employed in the government; but on the defeat of the Athenians in Sicily he was banished with many of his countrymen. He returned to Athens; but the thirty tyrants banished him from that city, and he retired to Megara. After Athens had recovered its freedom he exerted himself for the advantage of the city, and even sacrificed much of his property for the public welfare. Yet notwithstanding his generosity, the rights of an Athenian citizen were never granted him. At first he gave instruction in eloquence; but finding himself surpassed by Theodorus, another teacher of oratory, he devoted his time to writing orations for others. He wrote more than 200, some say 400 orations; only

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223, however, were regarded as genuine. His style is applauded as a perfect example of the simple Attic eloquence. Only thirty-four of his orations have come down to our times. They have been published in various collections of the Attic orators; the best separate editions of them are by Förtsch (Leipzig, 1829) and Scheibe (Leipzig, 1852).

LYSIPPUS, a sculptor who flourished in Sicyon about 330 B.C., in the time of Alexander the Great. Alexander would permit no one but Apelles to paint his portrait, and no one but Lysippus to make his statue. He was first a coppersmith, and afterwards devoted himself to sculpture. His statues were wrought with much greater beauty and elegance than those of his predecessors. They were almost all, if not all, in bronze. His favourite ideal subject was Hercules; several of his more celebrated statues were of Alexander, the most noted of which represented the Macedonian hero bearing a lance, which was considered as a sort of companion to the picture of Apelles, in which Alexander was seen, like a second Zeus, launching a thunderbolt.

LYTHAM, a watering-place of increasing popularity in Lancashire, agreeably situated in a sheltered position on the north shore of the estuary of the Ribble. It is clean and well built, has a parish church and another church in the early English style, also chapels for various denominations; market-hall, mechanics institution, assembly-rooms, cottage hospital, baths, and hotels. There are a pretty little public park, a neat iron pier, and an excellent beach for bathers. Pop. 5617.

LYTTELTON, GEORGE, LORD, a poet and historian, was the eldest son of Sir Thomas Lyttelton, baronet, of Hagley in Worcestershire, where he was born in January, 1709. In his nineteenth year he set out upon a tour to the Continent, and on his return in 1730 was chosen member of Parliament for Okehampton, and concurred in the measures of the opposition led by Pitt and Pulteney. When Frederick, prince of Wales, formed a separate court in 1737 he was appointed his secretary. On the expulsion of Walpole he was appointed one of the lords of the treasury, but never attained the rank of a political leader. In early life he had imbibed sceptical opinions; but being subsequently led into a conviction of the divine origin of Christianity, he composed his well-known Dissertation on the Conversion of St. Paul, first printed in 1747. About this time he lost his first wife, on whom he wrote the celebrated monody, and in 1749 married a lady from whom, after a few years, he separated by mutual consent. In 1751 he succeeded his father in his title and ample estate. At the dissolution of the ministry he was raised to the peerage by the title of Baron Lyttelton of Frankley, in the county of Worcester. From this time he lived chiefly in literary retirement, and in 1760 published his Dialogues of the Dead. The latter years of his life were chiefly occupied on his History of Henry II., which is the result of assiduous research, but too prolix. He died in August, 1773, leaving a son who succeeded him in his titles, and, with great talents, became conspicuous for a conduct entirely opposite to that of his father. The poems of Lord Lyttelton maintain a place among the collection of British poets for their correct versification and delicacy of sentiment rather than for higher qualities. His miscellanies in prose also display good taste and a cultivated mind. His works were first collected and printed in 1774, 4to, and since in 8vo. See Johnson's Lives of the Poets.

LYTTON, EDWARD GEORGE EARLE LYTTON BULWER-LYTTON, BARON, youngest son of General Bulwer of Woodalling, and Elizabeth Barbara Lytton of Knebworth, was born in May, 1805. His father died when the future novelist was quite young, and the care of his education devolved upon his mother, a lady of superior character and rare intelligence. After careful training under private tutors he entered Trinity Hall, Cambridge, where he graduated B.A. in 1826, and M.A. in 1835, and while at that university he gained the chancellor's prize medal for his English poem on Sculpture. He had, however, previously appeared as an author—Ismael and other Poems having been published when he was but fifteen. In 1826 he printed for private circulation a collection of his juvenile poems under the title of Weeds and Wildflowers. About this time also he published a poetic narrative, O'Neill, or the Rebel, and in 1827 his first novel, Falkland, which was afterwards suppressed. In both the last-mentioned works Byronic influence is very visible. In 1828 he produced Pelham, and shortly afterwards The Disowned, Devereux followed in 1829, and in 1830 Paul Clifford, the hero of which is of the sentimental, dashing highwayman school. In 1831 he tried his hand at poetical satire in the Siamese Twins, but with little success. It was in this year that he commenced his parliamentary career as member for St. Ives, and as a supporter of the Whigs, and an ardent advocate of the reform bill. At the general election of 1832 (the first reformed parliament) he was elected for Lincoln, which seat he held till 1841, when he was defeated by a more popular candidate. Meanwhile he had not deserted literature. In 1831 he produced Eugene Aram, a splendid specimen of the modern sensational novel; the hero being an enthusiastic scholar, a refined and ardent lover, a generous philanthropist, and a murderer for sordid lucre. He next, as editor of the New Monthly Magazine, turned to criticism, and published in that serial a number of essays, republished in two vols. in 1835 under the title of The Student. Other works of fiction quickly followed: The Pilgrims of the Rhine, The Last Days of Pompeii, and Rienzi, the two last-mentioned being his most brilliant essays in the field of pure romance; a remarkably successful political pamphlet, The Crisis, appeared in the same year. About this time, too, his first play, the Duchess de la Vallière, was produced, but proved a failure. In 1837 he published a work full of research and brilliant rhetoric entitled Athens, its Rise and Fall, and the well-known novel Ernest Maltravers with its sequel Alice, or the Mysteries. Then came a second play, The Lady of Lyons, which was instantly successful and still retains a strong hold on the stage. The same may be said of Richelieu and of Money, but the Sea Captain could not secure the suffrages of the theatrical public. He returned to novel-writing, and Night and Morning and Zanoni appeared in 1841 and 1842 respectively. Having lost his seat in Parliament he visited Germany, where he studied the literature of that country and translated the ballads of Schiller. For some time after this, owing to impaired health, his pen was laid aside. When he again came before the public it was as an imitator of Pope, in the New Timon. Several of his contemporaries were unsparingly criticized in this work, among others Tennyson, who was dubbed 'school-miss Alfred.' The laureate retorted in a more vigorous strain than was anticipated, describing his assailant as the lion who shook his mane *en papillotes*, the padded man who wears the stays, &c. In 1848 Bulwer invaded Tennyson's domain in his King Arthur, a poem, completed in 1870, and containing some noble passages of sentiment and glittering descriptive pieces. Harold, Lucretia, and the Last of the Barons, are also to be set down to this time. The Caxtons, a story of English domestic life, in the best and healthiest

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style of the author, appeared originally in Blackwood's Magazine, and was quickly followed by his *chef-d'œuvre* My Novel, a companion story (1851). In June, 1852, he again entered the House of Commons as one of the members for Herts, this time, however, as an adherent of the Conservative party. He represented this county until his elevation to the peerage as Baron Lytton of Knebworth in 1866. In 1858–59 he was appointed colonial secretary and privy-councillor. He continued to support the Conservative party in the House of Lords. Still enthusiastically devoted to literature he published in quick succession What will He Do with It, a novel which first appeared in Blackwood, and a clever poem, St. Stephen's (1859); A Strange Story, written for All the Year Round (1862); a poem, The Lost Tales of Miletus (1866); Walpole, a drama in rhymed Alexandrines (1869); Translation of Horace (1869). Among his latest productions may be mentioned Caxtoniana, a series of papers contributed to Blackwood; The Parisians, written for the same magazine; The Coming Race, published anonymously, and his posthumous novel, Kenelm Chillingly. He died 18th January, 1873. He was twice elected Rector of Glasgow University, in 1856 and 1858. His only son, Edward Robert, the present baron, has published, under the *nom de plume* of Owen Meredith, and more recently under his own name, several volumes of poems which have met with considerable success. Among the latest is Fables in Song.

M.

M, the thirteenth letter and the tenth consonant in the English alphabet, a labial, produced by a slight expiration with a compression of the lips. It is one of the liquids or semi-vowels, and was not therefore considered by the Romans a consonant; but was very faintly pronounced, rather as a rest between two syllables than as an articulate letter (Quint. ix. 4), which explains why it was subject to elision. It is one of the first letters which children learn to pronounce in connection with the easy vowel *a*. We even find the *m* suppressed at the end of words on some ancient medals and inscriptions; thus, on the medals of the Æmilian and Plautian families, we find PREIVERNV. CAPTV.; on others, AVGVSTORV. If the *m* is fully pronounced the sound passes partly through the nose, as is also the case with *n*. Hence, in French, it is generally nasal at the end of a syllable, as in *parfum, empereur*. The *mem* of the Hebrews, as a numeral, signified forty; the same was the case with the Greek *μ'*; *,μ*, however (characterized by the stroke before it), signified 40,000. In Latin M signified 1000; the original designation of this number was double D or (CIↃ), which gradually became an M. MM denotes 2000, and M 1,000,000. In numismatics M stands for a great number of words; for *Macedonia*, as LEG. M. XX., *Legio Macedonica Vicesima; Malca, Massilia, Mamertini*, and many other places or countries; for *Marcus, Manlius, Marcellus*, and other names. M.D. signifies *medicinæ doctor* (doctor of medicine); A.M. *artium magister* (master of arts); MS. *manu scriptum* (manuscript); MSS. (manuscripts). M in French often stands for *Monsieur;* MM. for *Messieurs*. M is used by printers for the unit of measure of printed matter. Types of the same fount have bodies of equal thickness in one direction, and the square of this dimension is used in determining the amount of printed matter in a given space, as a page for instance, and is termed an *m*.

MAAS. See MEUSE.

MAASTRICHT. See MAESTRICHT.

MACADAM, JOHN LOUDON, the great improver of roads by a process to which the well-known name of *macadamizing* has in consequence been applied, was born at Ayr probably in 1756, and educated at the parish school of Maybole. Having lost his father at the age of fourteen, he was sent to an uncle at New York, where he remained during the war of Independence, and realized a considerable fortune as agent for the sale of prizes. Much of this he lost, however, at the close of the war, when he returned to Scotland. In 1798 he was appointed agent for victualling the navy in the western ports of Great Britain, and took up his residence at Falmouth. He afterwards resided for many years at Bristol. It was here, in 1815, on being appointed surveyor of the Bristol roads, that he first had full scope for putting in practice the important improvements in road-making which had long before occupied his thoughts. Macadam, in carrying out his improvement, had expended several thousand pounds from his private resources; and the House of Commons, having been satisfied of the fact by the investigation of a committee, both reimbursed the actual outlay, and presented him with an honorary tribute of £2000. He died at Moffat in 1836.

MACADAMIZATION, a system of road-making invented by J. L. Macadam (see previous article), which consists in forming the roads out of hard materials such as granite, whinstone, and basalt broken into pieces, none of which are too large to pass through an iron ring 2½ inches in diameter, and then deposited evenly in a bed of from 6 to 12 inches in thickness. The bed thus laid becomes perfectly compact and smooth; and in proportion as it is worn away, or cut into ruts by traffic, can easily be restored by a new coating of materials. The process now commonly used seems so simple and natural, that, as usually happens in regard to useful inventions, one cannot help wondering that it was not sooner adopted. The attempt to introduce *macadamizing* into the thoroughfares of large towns has been almost entirely abandoned, because the constant tear and wear both makes it very expensive, and rapidly crumbles down the stones into powder, which in wet weather becomes tenacious mud, and in dry windy weather assumes the still more annoying form of clouds of dust.

MACAO, a seaport town and Portuguese settlement in China, in the province of Quang-tong, irregularly built on a high peninsula that terminates the island of Macao to the south, and joined to it by a narrow isthmus north from the town. It occupies a slope gradually descending to the sea, backed by a range of lofty hills, and having an extensive plain stretching east. It is nearly surrounded with water, and is open to the sea-breezes on every side. The houses occupied by the foreign population are large, roomy, and open; and the shops are numerous. The quay or 'Praya Grande' is commodious, forms a pleasant drive, and is protected by a battery. The harbour is formed between the peninsula on which

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the town stands and the large island Twee-lien-shan, to the west. Macao is considered the healthiest residence in South-east Asia. Near it, in a beautiful garden, is the grotto in which the poet Camoens is said to have finished the Lusiad. The settlement is about 8 miles in circuit; and its limits landward are defined by a barrier wall stretching across the isthmus, where a guard of Chinese troops is stationed to prevent foreigners from trespassing on the Inner Land. The principal exports are tea, cassia and cassia oil, anise and anise oil, and opium. The commerce, which is chiefly carried on with Hong-Kong, Canton, Batavia, and Goa, has greatly declined since the opening of the rival free ports, and a considerable part of the colonial revenue, which amounts to about £75,000, is drawn from a tax on the gambling tables for which Macao is notorious. It was in 1557 that the Portuguese first obtained permission to form a settlement and to trade at Macao. From 1563 they were required to pay a yearly tribute to the Chinese government, and their trading privileges were much restricted till 1844, when they were allowed to carry on commerce with the five ports then open to foreigners. Macao was then declared a free port, but the Chinese continue to ignore the territorial claims of the Portuguese. Till 1868 Macao was the seat of an infamous Coolie traffic, which was winked at by the Portuguese authorities. In that year the English interfered, and since then a check has been put to the worst of the barbarities formerly connected with the traffic. Pop. about 72,000.

MACARONI, Maccaroni, or Maccheroni, a preparation of fine flour, which forms a favourite article of food among the Italians. It is eaten in various ways, generally simply boiled, and served up with grated cheese. Macaroni is generally made in pieces resembling a long pipe-stalk of small diameter; sometimes, however, in other shapes, as flat, square, &c. It is a wholesome food, and a national dish of the Italians, particularly of the Neapolitans. It is made best in the neighbourhood of Naples, whole villages living almost solely by the manufacture; and in Naples it is continually sold in the streets, cooked for the lower classes, particularly for the *lazzaroni*. The pieces being very long, and being held in the fingers during the process of eating, some skill is required to manage them. This fashion of eating yard-long macaroni forms a subject of ridicule against the Neapolitans in more than one Italian comedy.—Macaroni was formerly also used as a term of contempt for a coxcomb or swaggerer.

MACARONIC POEMS, a kind of facetious Latin poems, in which are interspersed words from other languages, with Latin inflections. They were first written (at least with the above designation) by Teofilo Folengi, under the name of Merlino Coccaio, a learned and witty Benedictine, a native of Mantua. He was a contemporary and friend of Sannazaro. His principal poem in this style was called Maccaronea, because it was mixed up of Latin and Italian, as macaroni is mixed with cheese. We find an example of French macaronic verses in the third interlude of Molière's Malade imaginaire. It was introduced into England in the reign of Henry VII., when Skelton exhibited some specimens of it. It was fashionable under Elizabeth, in whose reign a poem on the Armada, of which Warton gives a specimen, was written. Drummond of Hawthornden also wrote a macaronic poem, of which the following will be a sufficient specimen:—

'Convocat extemplo burrowmannos atque ladavos,
Jackmannumque hiremannos, pleughdrivesters atque pleughmannos,
Tumblantesque simul, receso ex kitchine boyos,
Hunc qui dirtiferas terait cum dishcloute dishas,' &c.

MACASSAR, Makassar, or Mankassar, also called Vlaardingen, a town situated near the south-west end of the south-west peninsula of the island of Celebes, capital of the Dutch province of the same name, defended by Fort Rotterdam. Macassar, the capital of the native state of same name, was destroyed by the Dutch in 1660, and the present town, called by the Dutch Vlaardingen, was built on its site. It is a regularly built, pleasant place; the streets are broad, planted with trees, and cross each other at right angles, and the whole place has much of a Dutch aspect. It is surrounded with walls, outside of which are the three suburbs of the Bugis' village, the Malay village, and the Bahroe or New village. Macassar is reckoned a healthy place, the climate being almost as free from rain as that of Lima. It was made a free port in December, 1846, and carries on a considerable trade, both coasting and with China. It has an excellent roadstead, or rather harbour, formed by a long curved coral reef, which at most seasons of the year is a complete protection to the craft within it, although during the west monsoons the waves sometimes dash over it with great violence, and cast the prahus, or native boats, on the shore. Macassar is the principal centre from which boats engaged in the trepang fishing set sail. Pop. from 15,000 to 20,000.—Macassar is also the name of a district. See Celebes.

MACASSAR, Straits of, the channel or narrow sea between Celebes and Borneo, about 350 miles long, and from 110 to 140 wide, except at the north entrance, where it is contracted to 50 miles.

MACASSAR-OIL, so named from the district of Macassar in the Celebes, from which it is imported, is a kind of vegetable butter, of an ash-gray colour and rancid smell. The same name, however, is given to an English cosmetic, which is used to promote the growth of the hair, and consists essentially of castor-oil, mixed with a little olive or almond oil, coloured red by alkanet root, and highly perfumed.

MACAULAY, Thomas Babington, Lord, a distinguished historian and politician, was born on 25th October, 1800, at Rothley Temple, Leicestershire. His father, Zachary Macaulay, was the son of a clergyman of the Scottish Church, and had been a West India merchant, but had taken a prominent part with Wilberforce and Clarkson in endeavouring to effect the emancipation of the negro race. He was a rigid Calvinist, and an active member of the 'Clapham sect.' His son Thomas was educated in these tenets, but it would appear not to much effect, as in after life he was rather noted for his opposition to the 'bray of Exeter Hall,' as he termed it, and was generally stigmatized among the religious world for his latitudinarian principles. With the view of adopting the bar as a profession he entered Trinity College, Cambridge, in 1818, and obtained there great distinction as a prizeman, carrying off, among other honours, the chancellor's medal for a poem on Pompeii, in 1819, and a second time for a poem on Evening, in 1821, and a fellowship. He had also exhibited brilliant talents as an orator in the Union Debating Society at college, and it was evident that the fitting arena for his abilities must be the House of Commons. Meantime he took his degree of M.A. in 1825, was called to the bar at Lincoln's Inn in 1826, and contributed extensively to Knight's Quarterly Magazine, in which his first literary efforts appeared, including, among others, the ballads of the Spanish Armada, the Battle of the League, and Ivry. In 1825 he furnished to the Edinburgh Review his celebrated article on Milton; and this was succeeded by numerous others on various themes, historical, political, and imaginative, which were afterwards collected and published separately. In 1830 he entered Par-

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liament as member for the borough of Calne. As a supporter of the liberal cause he made an impression in the house from the very first, and more especially distinguished himself in pleading for the abolition of slavery in the West Indies. After the passing of the reform bill he was returned as member for Leeds; but in 1834 resigned his seat to proceed to India as a member of the supreme council, and its legal adviser in the drawing up of a new code of law for our Indian Empire. His labours in this capacity proved eminently satisfactory, and in 1838 he returned to England. In 1839 he was appointed secretary at war; and in Jan. 1840 was elected member for Edinburgh. He occupied the post at the war office till the accession of Sir Robert Peel's government in 1841. In 1842 he gave to the world his spirited Lays of Ancient Rome, and in 1846, on the restoration of the Whigs to power, was appointed paymaster to the forces, with a seat in the cabinet. At the new election in the same year his Edinburgh constituents refused to return him, mainly on account of the views he had expressed in favour of increasing the endowment of Maynooth College. In 1849 he was elected rector of Glasgow University. In 1852, notwithstanding his declinature to present himself formally as a candidate, he was again elected as member for Edinburgh. For a considerable time past Mr. Macaulay had projected what he intended should be a *chef d'œuvre*, and a lasting monument to his reputation. This was his famous History of England, the first two volumes of which were published in 1848, and two more made their appearance in 1855. They form a magnificent fragment of historical writing, but still merely a fragment, embracing a period of little more than twelve years, from the accession of James II. to the Peace of Ryswick in 1697. A fifth volume, compiled from the papers which he left behind, and bringing the work down to the death of William III., was published posthumously in 1861. It cannot be denied that the accuracy of his statements is sometimes questionable, a remark more especially applicable to his animadversions on the conduct of William Penn. He has also been accused of misrepresentation in his notices of Scotland, and more especially the Scottish Highlanders. In 1857 he was raised to the peerage with the title of Baron Macaulay. His health for some years back had been gradually declining, and on 28th December, 1859, he expired suddenly at Kensington of heart disease. His remains were deposited beside those of Sheridan, in Poet's Corner, Westminster Abbey. Lord Macaulay never was married.

MACAW (*Macrocercus*). These birds belong to the order of Scansores or Climbing-Birds, and are included in the parrot family (Psittacidæ). They form the typical members of a sub-family of the parrots to which the name of *Arainæ* has been applied. The true macaws form the genus Macrocercus (*Ara* of Kuhl), and are distinguished by having the cheeks destitute of feathers, and the tail-feathers of great length. The plumage is exceptionally brilliant—a distinction which when applied to a group of birds included among the showy parrots, conveys the idea of the most brilliant of colours and hues. The macaws are found exclusively in the tropical regions of America; Brazil, Guiana, and the West India Islands possessing the greatest variety of species. They usually inhabit moist situations, and live in pairs; the male and female sharing alternately the duties of incubation and of rearing the young. The nest is constructed generally in the hollows of trees; and they lay twice in the year, producing two eggs at each period. These birds feed chiefly on fruits and seeds, their large and powerful bills enabling them to break open the hardest seeds with ease and dexterity. The bill is also used extensively in climbing, and appears of equal service with the feet. They may be domesticated, but not with the same ease as the true parrots; and they never speak with the same distinctness or so readily as the latter birds. In a tame state sugar, bread, and fruits are their chief articles of diet. When first brought to Europe these birds were deemed highly valuable, and were frequently exchanged between princes and sovereigns as presents. Aldrovandus speaks of the macaw as early as 1572. The Scarlet Macaw (*Macrocercus macao*) of the West India Islands is a large and well-known species, measuring about 3 feet from the bill to the tip of the tail. The body colour is a bright red, the rump and tail coverts being blue, the wing-coverts greenish-blue and yellow, and the quill or large wing-feathers brilliant blue. The upper beak is white, the lower mandible being of a darkish hue. The Blue and Yellow Macaw (*M. Ararauna*) measures about 2½ feet in length, and has the back coloured blue with green tints; the under surface being of a brilliant orange-yellow. The beak is of a black colour, and the front of the throat is marked by a black patch which extends beneath the cheeks on each side. This species is indigenous to tropical America, and is the kind most commonly brought to Europe. The Green Macaw (*M. severus*) is of still smaller size, and is found in Guiana and Brazil. It is said to be exceedingly destructive to the coffee plantations in the former country especially, where it commits great havoc by eating the coffee-berries. The generic name *Ara*, already mentioned as sometimes applied to the macaws, and from which the name of the family is derived, has been taken from the Indian name for the macaws; the word itself being merely an imitation of the hoarse call or note of these birds.

MACBETH, or MACBEDA, the king of Scotland who, under the first form of the name, is so widely known from Shakspere's tragedy of the same name. Although the actual facts of the reign of this king agree in some particulars with those of the dramatist, the labours of critical historians have given a very different colour to them from that under which we view them in the play. In the play Macbeth is represented not only as a usurper, but as a tyrant, and an intolerable oppressor of his subjects; in reality he appears to have been, indeed, a usurper and the murderer of his predecessor, but under circumstances which rendered the crime nothing unusual in those days, and on securing the kingdom he appears to have used his power well. During the reign of Duncan, his predecessor, he was Maarmor of Ross, or of Ross and Moray, and as such ruled over all the land to the north of the Moray Firth and Loch Ness. Duncan determined to subdue the independent chiefs of the north, and while engaged in the attempt to do so was slain by Macbeth, or by his order, in 'Bothgowan,' which is interpreted to mean 'in a smith's hut.' The place is supposed to have been near Elgin, and the date of the event is 1039. The occasion of Duncan's presence in this neighbourhood furnishes an obvious motive for the deed, but Macbeth is also said to have been instigated to it by his wife Gruach, who was a grand-daughter of Kenneth IV., who had been murdered and succeeded by Duncan's grandfather, Malcolm II., as Duncan himself was by Macbeth. After this Macbeth reigned undisturbed for fifteen years, and, as has been said, reigned well. In particular, he is the first King of Scotland who is mentioned as a benefactor to the church, and he is likewise said to have been the first King of Scotland to offer his services to the pope. His dominions were more extensive than those of any previous King of Scotland, embracing the whole of what is now called Scotland except the

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Isles and the Western Highlands. At the time of his death Duncan had left two sons, both very young, who seem to have found a refuge during their minority with their maternal uncle, Seward, earl of Northumberland. On growing up these sons of Duncan, one of whom was called Malcolm, determined to avenge their father's death, and recover, if possible, his kingdom for themselves. In this undertaking they seem to have received the assistance of their uncle, with whose help they were able to raise a large army, with which they invaded Scotland in 1054. A battle was fought near Dunsinnane, which, though not decisive, appears to have turned out successfully for the invaders, inasmuch as by the time the next battle was fought we find that the invaders have advanced further north. This battle was fought in Lumphanan, in Aberdeenshire, and in it Macbeth was killed. Some time after the war ended in the complete victory of the sons of Duncan. Malcolm became king in 1056, and from this date the succession to the throne of Scotland becomes hereditary. Shakspere probably derived the information for his tragedy from the Chronicle of Holinshed, which was taken from authors who overlooked the excellent qualities of Macbeth as a king, but regarded him with all the horror with which, as friends of hereditary monarchy, they looked upon a usurper, especially since he was the first usurper they came upon in tracing the history of Scotland backwards. This is the most likely explanation of the infamy which has become attached to the name of a king who was in many respects better than those of the time in which he lived, and in others appears to have been at least no worse. (Burton's History of Scotland.)

MACCABEES, two apocryphal books of the Old Testament, which contain the history of Judas, surnamed Maccabæus, and his brothers, and the wars which they sustained against the kings of Syria in defence of their religion and the independence of their country. (See JEWS.) The author and the age of these books are uncertain. The Council of Trent placed them among the canonical books, but the Protestants have rejected them as apocryphal.

MACCABEES. See JUDAS MACCABÆUS and JEWS.

MACCLESFIELD, a market town and parliamentary borough of England, Cheshire, 17½ miles south by east of Manchester, on the North-Western, North Staffordshire, and Manchester, Sheffield, and Lincoln Railways, and on both sides of the Bollin, here crossed by three stone bridges. It is pleasantly situated near the north-western extremity of the forest of same name, and consists of four principal streets, which meet in the market-place. Among the principal buildings are the church of St. Michael, an ancient structure, founded by Eleanor, queen of Edward I., in 1278, and now undergoing a complete restoration; St. Peter's, in the early English style; and St. Paul's, with a tower and spire 141 feet high, and a fine organ; a handsome and spacious town-hall, in the Grecian style, containing court, assembly, and concert rooms; a subscription library of 20,000 volumes, a free library, a theatre, large almshouse, &c. The principal educational establishments are the grammar-schools, and there are also a school of design, a mechanics' institute, an infirmary, the county lunatic asylum, a public park, cemetery, and various charitable endowments. The staple manufacture is silk, which is carried on in about seventy mills employed in throwing silk, and numerous establishments in which broad silks, handkerchiefs, and similar goods are made. The cotton manufacture has also made some progress in the town; and there are several large dye-houses, foundries, and breweries. In the vicinity are extensive coal-pits, and stone and slate quarries. Macclesfield returns two members to Parliament. Pop. in 1881, 37,620.

MACCULLOCH (M'CULLOCH), HORATIO, a Scotch landscape-painter, born in Glasgow in 1806; died at Trinity, near Edinburgh, June 24, 1867. After studying art for some time in his native city he ultimately fixed his residence at Edinburgh. The first of his pictures which attracted much attention was a View on the Clyde, which was sent by him to the Scottish Academy's exhibition in the latter city in 1829. From this date he was a regular contributor to the Edinburgh, and occasionally also to the London exhibition. His paintings are nearly all of Scotch scenery. Among the most celebrated are A Highland Loch, Views in Cadzow Forest, Loch-an-Eilan, Mist on the Mountains, Loch Achray, and Loch Katrine. The last of these appeared at the international exhibition at Paris in 1867.

MACCULLOCH, JOHN, M.D., F.R.S., F.L.S., and F.G.S., an eminent mineralogist, was born in Guernsey on the 6th of October, 1773. He was educated at Edinburgh for the medical profession, and in 1791 received the degree of M.D. Being then too young to establish himself as a medical practitioner, he entered the artillery as assistant-surgeon. In 1803 he received an appointment as chemist to the ordnance, and in 1807 began to practise at Blackheath. A few years later he gave up both his situation under the board of ordnance and his practice to engage in some surveys of Scotland made by the desire of the government with various objects in view. The most important of these was a mineralogical and geological survey of Scotland, which was begun in 1826 and continued every summer till it was completed in 1832. He received from government for this survey £7000—a sum not by any means too large for the services he rendered. Some of the fruits of his separate surveys are before the public. The first was A Description of the Western Islands of Scotland, including the Isle of Man, &c. (two vols. 8vo, with one vol. 4to of plates, London and Edinburgh, 1819). Next, A Geological Classification of Rocks, with Descriptive Synopses, comprising the Elements of Practical Geology (London, 1821, one vol. 8vo). Thirdly, The Highlands and Western Isles of Scotland, in a Series of Letters to Sir Walter Scott, Bart. (London, 1824, four vols. 8vo). Fourthly, A System of Geology, with a Theory of the Earth, and an Explanation of its Connection with the Sacred Records (London, 1831, two vols. 8vo). In addition to these larger works, which arose out of his employment, he published in 1821 a Treatise on the Art of Making Wines; in 1823, an Account of Blair and Dunkeld (published anonymously); in 1827, Malaria, an Essay on the Production and Propagation of Poison; in 1827, an Essay on the Remittent and Intermittent Diseases. He also contributed many papers both to the Edinburgh Encyclopædia, and to Brande's Journal, on various subjects connected with Scotland generally, or its rocks and minerals; besides others on different topics. He died in Cornwall August 21, 1835, in consequence of injuries received in an accident he met with while out driving. He left at his death a variety of unpublished papers, among which was a work on Natural Religion, which was given to the world in 1837.

MACCULLOCH (M'CULLOCH), JOHN RAMSAY, a political economist and statistician, born at Isle of Whithorn, Wigtonshire, in 1789; died in London November 11, 1864. His first literary efforts were contributions made to the Scotsman, an Edinburgh newspaper, of which he afterwards became editor for a time. From 1818 he also contributed a large number of articles to the Edinburgh Review. In 1828 he was appointed professor of political economy in

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London University, and he retained that position till 1832. In 1838 he was appointed comptroller of the stationery office. During the last years of his life he enjoyed a pension of £200 a year from government on account of his services to letters. Besides his articles contributed to periodicals, Macculloch is the author of a large number of works, economical, statistical, and commercial. Among them are The Principles of Political Economy (1825); Historical Sketch of the Bank of England (1831); Dictionary of Commerce (first published in 1832, but frequently republished); Geographical Dictionary (first published in numbers, completed in 1841, and frequently republished); A Treatise on the Principles and Practical Influence of Taxation and the Funding System (1845); The Literature of Political Economy (1845); Treatises and Essays on Subjects connected with Economical Policy, with Biographical Sketches of Quesnay, Adam Smith, and Ricardo (1853). Macculloch also published a new edition of Adam Smith's Inquiry into the Nature and Causes of the Wealth of Nations, with a life of the author (1828), and another of Ricardo's published works, also accompanied by a biographical sketch (1846). Macculloch was one of the earliest advocates of free-trade in this country, having contested the soundness of the principle long before the agitation got up by the 'Manchester school,' with the view of having it adopted by the legislature as the foundation of our commercial policy.

MACE, a weapon of war in use in Europe, chiefly among the cavalry, as late as the sixteenth century, and still used among savage tribes. It consists merely of a staff about 5 feet long, with a knob at the end made of iron or some other heavy substance. The knob at the end was sometimes made more formidable by being covered with iron spikes. At present the mace is used as an emblem of the authority of officers of state (for example, the speaker of the House of Commons), before whom it is carried. It is made of the precious metals, or of copper, gilt, and ornamented with a crown, globe, and cross.

MACE, the outer, fleshy, and coriaceous cover (*arillode*) of the nutmeg. When the fruit is gathered the mace is carefully separated from the nut, dried in the sun, and afterwards is packed in chests of different sizes, in which state it is obtained in commerce. See NUTMEG.

MACEDONIA, in ancient geography, a territory lying to the north of Greece. Its earliest name is said to have been *Emathia*, which remained the name of the district between the Haliacmon and the Axius, two rivers falling into the Thermaic Gulf, now the Gulf of Saloniki. This district was the earliest seat of the Macedonian monarchy. There was also an older form of the name Macedonia, namely *Macetia*, whence the Macedonians were sometimes called Macetæ, even after the name Macetia had come to be disused. In the time of Herodotus the name Macedonia was applied only to the district situated south and west of the Lydias, another river which falls into the Thermaic Gulf, and which flows between the two already mentioned. Before the time of Philip of Macedon its boundaries were—on the south the Cambunian Mountains; on the west, Epirus, from which it was separated by Mount Pindus and Illyria, where the frontier line was ill defined; on the north by Pæonia, on the east by the Thermaic Gulf, and on the north-east by the Strymon. It did not then include the Peninsula of Chalcidice, between Amphipolis and Thessalonica. Philip extended the kingdom as far as the Lake of Lychnitis, in Illyria, in the west, Mount Scardus and Mount Orbelus in the north (so as to include the whole of Pæonia), and the river Nestus on the north-east. He added also the Peninsula of Chalcidice. The part which he conquered from Thrace, lying between the Strymon and Nestus, was called *Macedonia adjecta*. The provinces of Macedonia were, in general, known by name even before the time of Herodotus. In the time of Philip there were nineteen. The Romans, after the conquest of Macedonia, B.C. 168, divided the country into four districts:—1, the eastern, between the Strymon and Nestus, with a part of Thrace east of the Nestus as far as the Hebrus, and also some parts west of the Strymon (chief city, Amphipolis); 2, the rest of the region between the Strymon and the Axius, including the Peninsula of Chalcidice (chief city, Thessalonica); 3, the southern district, the region between the Axius and the Peneus, thus including part of Thessaly (chief city, Pella); 4, the mountainous country in the west (chief city, Pelagonia). The Roman province of Macedonia subsequently formed included the whole of Thessaly and Illyria, but not the part of Thrace between the Nestus and the Hebrus. Macedonia was inhabited by two different races—the Thracians, to whom belonged the Pæonians and Pelagonians, and the Illyrians. The language of the southern Macedonians shows that there must have been a large admixture of Dorian settlers amongst them. Pliny speaks of 150 different tribes who dwelt here at an early period; but we have no particular accounts of them. They were divided into several small states, which were incessantly at war with the Thracians and Illyrians, till Philip and Alexander gave the ascendency to one of these states, and made it the most powerful in the world. The first of these princes, who came to the throne in 359 B.C., taking advantage of the strength of the country and the warlike disposition of its inhabitants, reduced Greece, which was distracted by intestine broils, in the battle of Chæronea, B.C. 338. His son, Alexander, subduced Asia, and by an uninterrupted series of victories for ten successive years made Macedonia in a short time the mistress of half the world. After his death this immense empire was divided. Macedonia received anew its ancient limits, and after several battles lost its dominion over Greece. The alliance of Philip V. with Carthage during the second Punic war gave occasion to this catastrophe. The Romans delayed their revenge for a season; but when Hannibal was completely conquered they sent over T. Quinctius Flamininus, who defeated Philip at the battle of Cynoscephalæ (197 B.C.), and compelled Philip to sue for peace, which was only granted upon his agreeing to acknowledge the independence of Greece, to surrender his vessels, to reduce his army to 500 men, and defray the expenses of the war. Perseus, the successor of Philip, having taken up arms against Rome, was totally defeated at Pydna by Paullus Æmilius, B.C. 168, and the Romans took possession of the country. Indignant at their acts of oppression, the Macedonian nobility and the whole nation rebelled under Andriscus. But after a long struggle they were overcome by Quintus Cæcilius Macedonicus; the nobility were exiled, and the country became a Roman province, B.C. 148. Macedonia now forms a part of Turkey in Europe, and is inhabited by Wallachians, Turks, Greeks, and Albanians.

MACERATA, a town in Italy, capital of the province of the same name, on a lofty eminence midway between the Apennines and the sea, 21 miles south of Ancona. It is walled, with six gates; and consists in general of spacious streets and handsome houses. The principal buildings are the cathedral, provincial palace, and theatre, all situated in a large public square, various churches and convents, a college, museum, &c. The edifice erected outside the gates for the game of *pallone* is said to be the largest in existence, and a church in the vicinity is regarded as one of Bramante's best designs. Pop. 10,065.—The

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province, bounded north by Ancona, west by Umbria, south by Ascoli, and east by the Adriatic, has an area of 1056 square miles, is generally mountainous, but well wooded, and on its lower slopes fertile and well cultivated, producing much corn, fruit, and hemp, and rearing great numbers of sheep and cattle. Pop. (1880), 250,368.

MACERATION (from *macero*, to soften by water) consists in the infusion of substances in cold water, in order to extract their virtues. It differs from digestion only as the latter operation admits the application of heat. Maceration is preferable in cases where heat would be injurious, as where volatile and aromatic substances are used.

MACGILLICUDDY REEKS, a picturesque mountain-range, Ireland, in the county of Kerry, extending for 13¼ miles from the lakes of Killarney on the east to Lough Carra on the west. It is the loftiest mountain-range in Ireland; Carrantual, the highest peak, rises 3404 feet above sea-level.

MACGILLIVRAY, WILLIAM, LL.D., a distinguished naturalist, was a native of the island of Harris; and having early shown a great turn for natural history, became acquainted with Professor Jameson, of Edinburgh, who appointed him his assistant. He was afterwards made conservator of the museum of the Royal College of Surgeons in Edinburgh. While engaged in these employments he had ample opportunity for prosecuting his favourite studies, and did not neglect to turn it to the best advantage. Besides numerous papers contributed to various scientific journals, he is the author of a Manual of Geology, a History of British Quadrupeds, published in Jardine's Naturalist's Library, a History of the Molluscous Animals of the Counties of Aberdeen, Kincardine, and Banff; and what is regarded as his principal work, a History of British Birds, in three volumes, two of which were published after his death. He was latterly appointed professor of civil and natural history in Marischal College, Aberdeen, and died there on 5th September, 1852.

MACHAIRODUS. The generic name of a large species of extinct tiger, the fossil remains of which occur in the Miocene and Pliocene rocks of Europe, South America, and India. This form was of very large size; and several specimens must have attained the size of full-grown and existing lions. The technical name of the genus is derived from the large size and peculiar shape of the upper canine teeth, these organs being serrated, 'sabre-shaped,' and presenting characteristic differences from those of existing, or even of allied and extinct forms. Several species are described under the generic term *Machairodus*.

MACHIAVELLI, NICCOLO, a distinguished Italian statesman and historian, born at Florence May 3, 1469, of a noble family, whose members had enjoyed the highest dignities in the republic. Little is known of his youth, and nothing of his education, except that he studied under Marcello Virgilio Adriani. On account of his distinguished talents he was appointed in the first half of 1498, before he had completed his twenty-ninth year, chancellor of the second chancery of the signory (*signoria*, supreme authority of the state), and a few months later secretary to the Ten, from which latter appointment he became widely known as *il Segretario Fiorentino*. He had scarcely entered upon the duties of his office when he revealed his extraordinary capacity for politics on the occasion of being sent on a special mission to the Lord of Piombino, a capacity of which he gave further proofs in twenty-three subsequent embassies to Italian and foreign princes, and fifteen commissions to execute special trusts in different parts of the Florentine dominions. He was four times plenipotentiary at the French court (July, 1500–Jan. 1501; Jan. 1504; July, 1510; Sept. 1511), and he was sent in the same quality to the court of Duke Valentino (Cesare Borgia) in 1502; to that of Pope Julius II. in Aug. 1506; and to the Emperor Maximilian, whom he met at Bolzano (Botzen, in the Tyrol) in 1507. On all these and other occasions he distinguished himself not less by his patriotism and fidelity to the republic than by his diplomatic ability. The republic acknowledged his great services, but rewarded them sparingly, so that he was sometimes obliged to petition the *signoria* on account of his poverty. Machiavelli held his offices of chancellor and secretary uninterruptedly for fourteen and a half years; but when the Medici (Giuliano and Giovanni de' Medici), with the aid of Pope Julius II., re-entered Florence in 1512 he was the first object of their anger, and in Nov. 1512 was deprived of both his offices, and exiled for a year to a part of the Florentine territory. The decree by which he was exiled was afterwards mitigated so as to allow him to remain in the city, and only to exclude him from the palace of the signory. His misfortunes were increased in the beginning of the following year, when he was accused of being implicated in the conspiracy of Capponi and Boscoli against the Medici, in consequence of which he was cast into prison and put to the torture with the hope that he might acknowledge his own complicity and betray the names of some of his supposed associates. But he bore the torture with firmness, and his examiners were unable to extort any confession from him. He remained in prison for a short time after, but when Giovanni de' Medici was elevated to the papacy as Leo X., in March, 1513, that pontiff caused him to be released, whereupon he retired to his country seat of San Casciano. Here he lived for several years in retirement and in far from easy circumstances, yet bearing his reverse of fortune with admirable equanimity. He devoted himself now to letters, and it is to this period that we are indebted for perhaps the most important, certainly the most celebrated, of his works, including Il Principe, Discorsi sulla prima deca di T. Livio, Dell' Arte della Guerra, and his comedies Mandragola and Clizia. It was not till after the death of Giuliano de' Medici (1516) and his successor Lorenzo (1519) that Machiavelli received any prominent marks of favour from that family; but both the Cardinal Giulio (afterwards Clement VII.), who succeeded Lorenzo in the government of Florence, and Leo X. now seemed desirous of making use of his abilities, and it was at the request of the latter that he wrote his Discorsi sopra riformare lo stato di Firenze. After 1521 he received various commissions from the Florentine government, but they were mostly of secondary consequence, and the rewards which he received for the performance of them were not sufficient to deliver him from the constant state of embarrassment in which he found himself. The last task intrusted to him was the most important which he received after his restoration to public life. It was in 1527, when the army of the emperor, under the command of the Constable de Bourbon, was descending upon Italy, and it was unknown whether its destination was Florence or Rome, Machiavelli was sent to watch its movements, and to induce the army of the League, in case of necessity, to move to the defence of Tuscany. When he saw the invading army bend its march towards Rome he returned to Florence. He died in poverty on the 22d of June, 1527, shortly after his return to his native city. He was buried in the Church of Santa Croce, and a monument to him was erected by Earl Cowper in 1787.

The writings of the immortal Florentine may be arranged under four heads—history, politics, military treatises, and belles lettres. His eight books on the

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history of Florence, written at the command of Clement VII., begin with the year 1215, and end with Lorenzo de' Medici in the year 1492. They are among the first historical works of modern times, which deserve to be placed side by side with the beautiful remains of antiquity. The Life of Castruccio Castracani, Lord of Lucca, in which Machiavelli illustrates his own views of the qualities of a general and a statesman, is more properly a romance than a biography. Under the head of politics are included his two most important works—The Prince (Il Principe) and the Discourses upon the ten first books of Livy (Discorsi sopra la prima deca di T. Livio)—his Legazioni, in which he gives accounts of the various embassies in which he was employed, and his treatises upon the affairs of France, Germany, and Italy, the materials for which he gathered on the occasion of these embassies, and which are equally remarkable for the force and conciseness of their style, and for the shrewdness and accuracy of the observations contained in them. The first of these works is by far the best known of all Machiavelli's writings, on account of the maxims which it inculcates and the disputes that have arisen as to the scope of the work and Machiavelli's object in writing it. It was written in 1513, just after the return of the Medici, and is dedicated to Lorenzo de' Medici, by whom and by Giuliano de' Medici alone it was originally intended to be perused. The subject of the treatise (which is a short one) is the means by which a prince may acquire and maintain power; and what most strikes every modern reader of the book is the undisguised manner in which the author exhorts a prince to make use of all means, whether good or bad from a moral point of view, for these purposes, provided only that they are fitted to effect his object. The purpose of Machiavelli in writing the work was placed beyond any doubt by the discovery in 1810 of a letter written by Machiavelli on the 10th of December, 1513, to a friend of his called Vettori, in which he plainly avows that the work was written in the hope of commending himself thereby to the Medici and being employed by them in public affairs. This letter leaves us in no doubt as to at least one of the objects which Machiavelli had in view in writing this treatise, but we cannot suppose that this was his only object. The greater part of the treatise is not only consistent with this object, but does not necessarily imply any other. But when we come to read in the last chapter the passionate appeal to the Medici family, in which, calling to mind the examples of Moses, Cyrus, and Theseus, he exhorts them to liberate Italy from the foreign dominion, the miseries of which he feelingly depicts; points out the circumstances which were favourable to such an enterprise at the time at which he wrote; indicates the causes of the ill success of former attempts of a like nature, giving reasons why one should not despair of the success of a renewed and better conducted attempt; declares that the foreign domination stinks in the nostrils of every one (*a ognuno puzza questo barbaro dominio*), and shows, from the hatred which the Italians entertained towards their foreign masters, how ready they would be to follow any who would undertake their deliverance; states the advantages which the Medici family possessed for acting as leaders, and concludes by drawing encouragement from the words of Petrarch—

> 'Virtù contra furore
> Prendera l'arme; e fia 'l combatter corto:
> Chè l'antico valore
> Negl' italici cor non è ancor morto;'

and when we bear in mind the devotion to his country which Machiavelli exhibited throughout his whole life, we cannot doubt that at least one motive which he had in writing The Prince was love of country, that although he was peculiarly attached to his own native state yet his patriotism extended to the whole of Italy, that he hoped by this treatise to induce the Medici to attempt to make Italy a united state free from the influence of foreigners, and also hoped no doubt himself to become the chief instrument in effecting this work as the adviser of the family to whom he was addressing himself, a position for which his past experience and the work which he now dedicated to them showed that he was abundantly qualified. The theory that The Prince is in reality a covert satire upon tyrants is untenable. The whole tone of the work is against this supposition, not to mention the fact that it would be a strange thing to write a satire for the special perusal of those who were satirized. The Prince was first published in 1532 by permission of Pope Clement VII. In a treatise composed in the year 1519 upon a reformation in the state of Florence, he advises the Pope Leo X. to restore the republican form of government to this city, although he pretends to have the aggrandizement of the Medici in view. His great military treatise is entitled Dell' Arte della Guerra, a work in seven books written to show the Italians that they were able to recover their freedom without the assistance of the foreign mercenaries so generally employed in the states of Italy; and he shows himself fully sensible of the great importance of infantry, then little valued. Frederick the Great knew and esteemed this treatise. His contributions to belles lettres consist of comedies and novels. His comedies La Mandragola and La Clizia are the first regular dramas written since the time of the Romans. Voltaire preferred the first to any of the plays of Aristophanes. His other poems are full of thought. The novel entitled Belphegor is very fine, and has been versified by La Fontaine. His description of the pestilence which raged in Florence in the years 1522–23, if it is indeed from his pen, of which serious doubts have been entertained, is very inferior to the account given by Thucydides of a similar calamity, and is described by Macaulay as abounding in wretched puerilities almost unworthy of a schoolboy. Among the editions of the collective works of Machiavelli may be mentioned those of Milan, 1810–11; Florence, 1813, 1818–21; Milan, 1821–22; Florence, 1826, 1843.

MACHINERY. Any contrivance which converts the energy given to it into some more suitable form is a machine. The steam-engine is a machine which converts the potential energy of coal into the kinetic energy of moving wheels or other masses. Water-wheels and turbines are machines which convert the potential energy of heads of water into energy of motion. The human body converts the potential energy of food into heat, mechanical work, and various other forms of energy. Propellers of vessels convert the energy of motion of wheels and shafts into mechanical work which overcomes the resistance of the water to the moving of the vessels. Levers, cranes, pulleys, wedges, screws, hydraulic presses, water and air pumps convert the mechanical work given out by the human body or by a steam-engine into other more suitable forms of energy. No machine converts all the energy given to it into the more suitable form; part of it is converted into a very unsuitable form of energy, namely, heat due to friction; hence the impossibility of the existence of a perpetual motion. The ratio of the work usefully performed to the energy given to a machine is called its *efficiency*. Physicists are acquiring more and more knowledge of the different forms of energy, and of nature's methods of converting one form into

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another. By means of this knowledge machinery is invented to serve all sorts of purposes. The use of simple tools, the sword and spear, the hammer and spade, the chisel, file, and axe, the lever, pulley, wheel and axle, inclined plane, screw, &c., and combinations of these into lathes and other complex tools, and the use of rollers and wheels on level roads, and boats on canals for transferring heavy weights, were the results of long-continued observations and experiments of men. These machines or tools enabled man to overcome great forces and to subject matter to many processes; but the difficulty of combining the energies of a great number of animals greatly retarded their development, a process which became one of wonderful rapidity when it was discovered that heat is a form of energy, that man derives his power of doing work from the combustion of his food, and that the energy of wood and coal and other minerals might be substituted for manual labour. We direct the attention of readers to works on civil and mechanical engineering for the use of steam-engines and machinery in lifting great weights, draining mines and marshes, twisting, rolling, and hammering masses of metal, and otherwise exerting great forces, in spinning and weaving cotton, flax, and silk, and in a thousand other manufacturing processes which we cannot here attempt to enumerate.

Machinery affords a sure means of remedying the inattention of human agents; for instance, in mechanism for counting the strokes of an engine or the number of coins struck in a press. The tell-tale, a piece of mechanism connected with a clock in an apartment to which a watchman has not access, reveals whether he has neglected at any hour of his watch to pull a string in token of his vigilance. The precision with which all operations are executed by machinery, and the exact similarity of the articles made, produce a degree of economy in the consumption of the raw material which is sometimes of great importance. This similarity of things made by the same tool is very remarkable; if the top of a box is to be made to fit over the lower part, it may be done by gradually advancing the tool of a sliding rest; after this adjustment no additional care is requisite in making a thousand boxes. In printing and copying by machinery the impressions from the same block or die have a similarity which no labour of the hand could produce; hence almost unlimited pains may be bestowed in producing a model which shall cost ten thousand times the price of each copy. Models are copied by printing, by moulding, by stamping, by punching, with or without alteration of dimensions. A remarkable example of the arts of copying lies before the reader of these pages. 1. They are copies obtained by printing from stereotype plates. 2. Those plates are copies obtained (by casting) from moulds formed of *papier mâché*. 3. The moulds are copies obtained by forcing the *papier mâché* while soft upon the movable types. 4. The types are copies (by casting) from moulds of copper called matrices. 5. The lower part of the matrices, bearing the impressions of the letters or characters, are copies (by punching) from steel punches, on which the same characters exist in relief. 6. The cavities in these steel punches, as in the middle of the letters *a*, *b*, &c., are produced from other steel punches in which those parts are in relief.

The contrivances by which the motion of machinery is kept uniform (governors), those by which energy is allowed to accumulate at intervals in a machine when the work to be done is greater at some times than at others (the fly-wheel, &c., as in steam-engines and punching and pile-driving machines), and the various common contrivances for transferring work, are described in MECHANISM.

MACKENZIE, SIR GEORGE, a celebrated Scottish lawyer and state officer, born at Dundee in 1636; died in London May 2, 1691. He was educated for the Scottish bar, and passed as an advocate in Jan. 1659. That he quickly gave proofs of his talent is evident from the fact that in 1661 he was selected as one of the counsel of the Marquis of Argyle, then tried by a commission of Parliament for high treason. On this occasion he acted with so much firmness, and even boldness, as at once established his character The purely literary labours of this eminent person appear to have been chiefly executed during his earlier years. His Religio Stoica, or a short Discourse upon several Divine and Moral Subjects, appeared in 1663. Two years afterwards he published his Moral Essay on Solitude; in 1677 his Moral Gallantry, to which he added a Consolation against Calumnies. The fiery course of politics which he had afterwards to run made a hiatus of considerable extent in the elegant literary pursuits of Mackenzie but after his retirement from public life he wrote an essay on Reason (London, 1690) and a treatise on the Moral History of Frugality (1691), both of which may be classified with those just mentioned.

Soon after the Restoration he was appointed a justice-depute, or assistant to the justiciar or chief-justice, a situation the duties of which were almost equivalent to that of an English puisne judge of the present day in criminal matters. Within a few years after this period (the time is not particularly ascertained) he was knighted. In 1669 he represented the county of Ross, where the influence of his family was extensive, in Parliament. Here he sought distinction at first by his advocacy of popular measures, and in this he succeeded so well that he would have gone to his grave with the character of a patriot, had he not been placed in a position where serving a king was more beneficial to himself than serving the people. On the 23d of August, 1677, he was named king's advocate on the dismission of Sir John Nisbet. The first important political case in which he acted as public prosecutor was that of the son of that Earl of Argyle whom he had defended in 1661. After this celebrated trial he appears to have obtained, as part of the spoil, a gift of the barony of Bute, ratified by the Parliament of 1681. It would be a vain task to enumerate the minor state prosecutions which in this eventful period gave full employment to this active servant of government; most of them are well known, and they were at any rate numerous enough to stamp him in the minds of his opponents with a character which must live with his name—'the bloodthirsty advocate.' The revolution terminated his political career. He then retired to Oxford, but did not long survive to enjoy his literary leisure.

Sir George wrote several works of a more laborious cast than those to which we have referred. Among these are Institutions of the Law of Scotland (Edin. 1684); Laws and Customs in Matters Criminal (1674, 4to); a Vindication of the Government in Scotland during the Reign of King Charles II. (Lond. 1691). His Memoirs, or account of his own times, certainly the most interesting of all his works, though promised at that time, was withheld through the timidity of his friends, but was at last published in 1821. It is full of graphic pictures of the state of the times, and if not so descriptive in character as Clarendon or Burnet, is often more lively in the detail of incident, and more acute in perceiving the selfish motives of the actors. One of his chief titles to remembrance is the fact of his having been the founder of the Advocates' Library at Edinburgh.

MACKENZIE, HENRY, the author of The Man of Feeling, was born at Edinburgh in August, 1745, and died there Jan. 14, 1831. After being educated

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at the High School and University of Edinburgh, and studying the modes of English exchequer practice in London, he settled in Edinburgh as one of the attorneys in the Scottish Court of Exchequer. His professional labour, however, did not prevent his attachment to literary pursuits. When in London he sketched some part of his first and very popular work The Man of Feeling, which was published in 1771 without his name, and was well received. In 1773 he published his Man of the World, which was intended as a counterpart to The Man of Feeling. In his former fiction he imagined a hero constantly obedient to every emotion of his moral sense. In the Man of the World he exhibited, on the contrary, a person rushing headlong into misery and ruin, and spreading misery all around him, by pursuing a happiness which he expected to obtain in defiance of the moral sense. In 1777 he published a third novel, Julia de Roubigné, which has been pronounced by several eminent critics to be the best of his works. From Jan. 1779, to May, 1780, Mackenzie acted as editor of the Mirror, a periodical in the style of the Spectator, consisting of essays written by the members of a literary club then formed at Edinburgh. A large number of the essays were written by Mackenzie himself. The Lounger, a work of exactly the same character, was commenced by the same writers, and under the same editorship, February 6, 1785, and continued once a week till the 6th of January, 1787. On the institution of the Royal Society of Edinburgh in 1783 Mr. Mackenzie became one of the members. About this time he began to devote himself to German literature, and the fruits of his studies appeared in the year 1791 in a small volume containing translations of the Set of Horses by Lessing, and of two or three other German pieces. Various tracts written by him at this period to counteract the progress of revolutionary principles, with the friendship of Lord Melville, obtained for him in 1804 the lucrative office of comptroller of taxes for Scotland, which he held till his death. In 1808 he published a complete edition of his works in eight volumes. These include, in addition to the works already mentioned, four dramatic pieces, the principal of which is The Prince of Tunis, lives of Dr. Blacklock, Lord Abercromby, and William Tytler, and some critical essays. After his appointment to the office of comptroller of taxes, owing to the arduous nature of its duties, Mackenzie ceased almost entirely from literary production.

MACKENZIE RIVER, a large river in British America. It rises in the western extremity of Great Slave Lake, flows first west, then north, and finally north-west; and after a course of about 1000 miles falls into the Arctic Ocean by numerous mouths, the most western of which is in lat. 68° 50′ N.; lon. 136° 37′ W. Its principal affluents, including the feeders of Great Slave Lake, are the Athabasca, the Peace, the Liard, and the Peel. It has a number of forts along its banks. It was discovered and navigated by Alexander Mackenzie in 1789.

MACKEREL (*Scomber*, Pl. CIII.–CIV. fig. 2), the type of the family Scomberidæ, included in the Acanthopterous division of the Teleostean fishes. Spiny rays exist in the front dorsal fin, and in front of the other fins. The lower pharyngeal bones are distinct and separated. The body of the well-known Common Mackerel (*Scomber scombrus*) is somewhat spindle-shaped, the mouth being large and protrusible. The colour is a bluish-black, which is most persistent along the back, whilst the body is banded on the upper portion with undulating blackish stripes. The hues of the body are exceedingly brilliant; its lustre continuing long after death. The soft portion of the second dorsal fin is split up into a series of small fins running along the hinder portion of the back; whilst the soft portion of the anal fin is similarly divided, and gives rise to a series of small detached fins extending along the lower surface of the tail. In habits, the mackerel appears to be migratory, vast shoals of these fishes visiting the British and American coasts during May and June, when they are taken in long 'drift nets,' which are sunk at night and taken up in the early morning. These nets may extend for several miles, and the meshes are of such a size that the heads of these fishes are readily admitted, whilst they are detained and caught by the pectoral fins and gill-covers, the entanglement of these parts preventing the fishes from escaping. The mackerel is an exceedingly voracious fish, and is also caught by hook and line. It bites freely at anything brightly coloured or of glittering appearance; and a piece of red flannel on this account forms a favourite bait with fishermen. In size the common mackerel averages 14 inches in length, and weighs from 1½ to 2 pounds. The capture of the mackerel always succeeds best during a gentle breeze of wind, and hence the fishermen are accustomed to call such favouring weather by the name of 'mackerel breezes.' The spawning takes place in May and June, and it is when approaching the shores for that purpose that these fishes are caught in such abundance; although the mackerel may also be fished off the British coasts much later on in the season. The flesh of the mackerel is somewhat fat and high-tasted. Among the Romans the celebrated *sarum*, a pickle or sauce, was made from the fat of this fish, and fetched a very high price among the *gourmands* of classical times. This *sarum* was said to be a powerful digestive tonic, and even in the sixteenth century it was apparently used in the East; but later authors traced the origin of this condiment to a *Sparoid* fish (*Sparus Smaris*) rather than to the mackerel. The migration of the mackerel has not been definitely ascertained, and has been much disputed as to its nature and limits. During the winter these fishes were supposed to inhabit the northern seas, and to pass southwards to the Atlantic Ocean early in the year. They were thus believed to approach the shore, as has been already stated, in May and June to spawn. Later observations made on other fishes, as well as on the mackerel, would seem to indicate that the migration is merely one from deep to shallower waters in the spring; these fishes, according to this latter view, spending the winter in the deeper waters of the sea. There appear to be a few varieties of the common species of mackerel; the United States species being the *Scomber vernalis*, which closely resembles the common British mackerel. The fish is said to attain highest perfection in June and July; and at the end of October the young mackerel, hatched in the previous May or June, may be fished and eaten.

MACKINTOSH, Sir James, eminent as a jurist, a statesman, and an author, was descended of an ancient Scottish family, and born at Alldowrie, about 7 miles from Inverness, on the 24th of October, 1765. He was educated at King's College, Aberdeen, and afterwards at the University of Edinburgh, where he studied medicine, and took the degree of M.D. in 1787. He then went to London, where, in 1791, he attracted great attention by the publication of his Vindiciæ Gallicæ, in answer to Burke's Reflections on the French Revolution. In the year following (1792) he quitted the medical profession, and began to study for the English bar at Lincoln's Inn. He was called to the bar in 1795. In 1799 he acquired great reputation as a jurist by a course of lectures on the Law of Nature and Nations, which he repeated in 1800; and in 1803 he distinguished himself no less as an orator by his brilliant defence

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of Peltier, prosecuted for a libel on Napoleon Bonaparte. The Recordership of Bombay, with the dignity of knighthood, was soon after conferred on him (1804). The period of his official residence at Bombay was marked by his exertions in the amelioration of the criminal law, the foundation of the Literary Society in Bombay, and his valuable communications in the Asiatic Register. His return to England was hastened by a severe illness. He left Bombay in November, 1811, retiring from the recordership with a pension of £1200 per annum. In 1813 he became member of Parliament for Nairn. He was afterwards elected member for Knaresborough, which he continued to represent to the end of his life. He was also elected Lord Rector of the University of Glasgow in 1822, and again in 1823. In 1828 he was appointed a member of the privy-council, and in 1830 was made commissioner for Indian affairs in Earl Grey's administration. In Parliament Sir James took a prominent part in all questions connected with foreign policy and international law; but more especially distinguished himself in the discussions on the alien bill, the criminal law, the liberty of the press, religious toleration, the slave-trade, the settlement of Greece, reform in Parliament, and on the right of our colonies to self-government. In politics he was a Whig, and all his votes and speeches in Parliament were in favour of the opinions and sentiments of that party; but he was, perhaps, one of the most moderate and tolerant politicians that ever existed, as the natural mildness and benevolence of his disposition never failed to mingle largely in whatever character he assumed, whether author, statesman, or judge. Sir James died in London on the 30th of May, 1832. As an author his most finished production is his Dissertation on the Progress of Ethical Philosophy, in the Encyclopædia Britannica. He also published a life of Sir Thomas More in Lardner's Cyclopædia, and two volumes of an abridged History of England. These two little volumes contain some striking passages and disquisitions, but do not furnish a continuous narrative of the period which they embrace. A third volume was intended to be added, but he died before he was able to bring it down any further than the fourteenth year of the reign of Elizabeth. A fragment, consisting of nine chapters, entitled A Review of the Causes of the Revolution of 1688, is all that we possess of a great historical work on the affairs of England since the Revolution, which he had long contemplated, but was prevented by his parliamentary labours and the infirm state of his health from completing. He also contributed various excellent articles to the Edinburgh Review.

MACKNIGHT, James, a learned Scottish divine, born in 1721, was educated at Glasgow and Leyden, and on his return was ordained minister of Maybole, where he remained sixteen years, and composed his Harmony of the Gospels (London, 1756). In 1763 he published his Truth of the Gospel History. In 1769 he became minister of Jedburgh, and in 1772 one of the ministers of Edinburgh. Dr. Macknight employed nearly thirty years in the execution of his last and greatest work on the apostolical epistles—a New Literal Translation from the Greek of all the Apostolical Epistles, with Commentaries and Notes, Philological, Critical, Explanatory, and Practical (1795, four vols. 4to). He died in 1800.

MACLAURIN, Colin, a celebrated mathematician and philosopher, born at Kilmoddan in Argyleshire, in 1698. He studied at Glasgow, where he distinguished himself in mathematics. In 1717 he obtained the mathematical chair in the Marischal College at Aberdeen, and two years after was chosen a fellow of the Royal Society. In 1720 he published Geometrica Organica, a work on curves. In 1725 he was elected professor of mathematics at Edinburgh, where his lectures contributed much to raise the character of that university as a school of science. A controversy with Bishop Berkeley led to the publication of Maclaurin's great work, his Treatise on Fluxions (Edinburgh, 1742, two vols. 4to). He died June 14, 1746. He was also the author of a Treatise on Algebra; an Account of Sir Isaac Newton's Philosophical Discoveries; papers in the Transactions of the Royal Society; and other works.

END OF VOL. VIII.

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